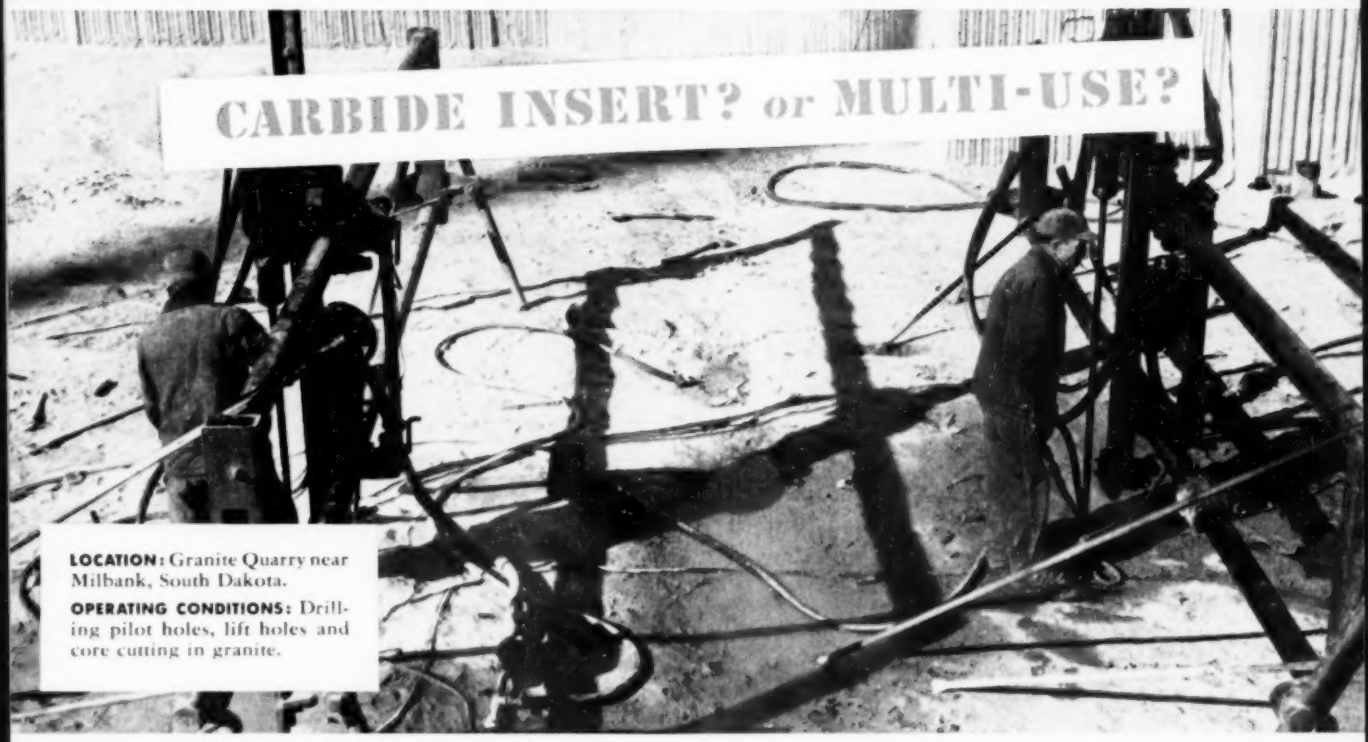
ROADS AND STREETS

HIGHWAYS BRIDGES
AIRFIELDS
HEAVY CONSTRUCTION

JUNE 1953



LOCATION: Granite Quarry near Milbank, South Dakota.

OPERATING CONDITIONS: Drilling pilot holes, lift holes and core cutting in granite.

Melrose Granite Co. cuts drilling time 25% with TIMKEN® carbide insert bits!

PILOT hole drilling, core cutting, lift hole drilling—the Melrose Granite Company uses Timken® carbide insert bits for all these drilling jobs—and has cut drilling time 25%!

Timken carbide insert bits are always best for highest speed through hard and abrasive ground. They're most economical for constant-gage holes, small diameter blast holes and very deep holes.

But they may *not* always be best for *all* your drilling jobs!

When you're drilling ordinary ground, Timken multi-use bits are most economical! With correct and controlled reconditioning, they give you lowest cost per foot of hole when full increments of steel can be drilled.

Best of all, you can change from Timken carbide insert bits to Timken multi-use bits, easily, quickly—right on the job! As many as 93 different Timken bits in the same thread series fit the same drill steel.

All Timken bits are made of electric furnace Timken fine alloy steel and have the shoulder union developed by Timken that protects threads from drilling impact.

For help in selecting the best bit type for your job, call on the Timken Rock Bit Engineering Service. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

Timken threaded multi-use rock bit

Timken threaded carbide insert rock bit

TIMKEN

your best bet for the best bit . . . for every job

Progress in Motor Grader Design

Allis-Chalmers new AD-40 shows importance of visibility. Operator can see front wheels — both ends of blade while he works.

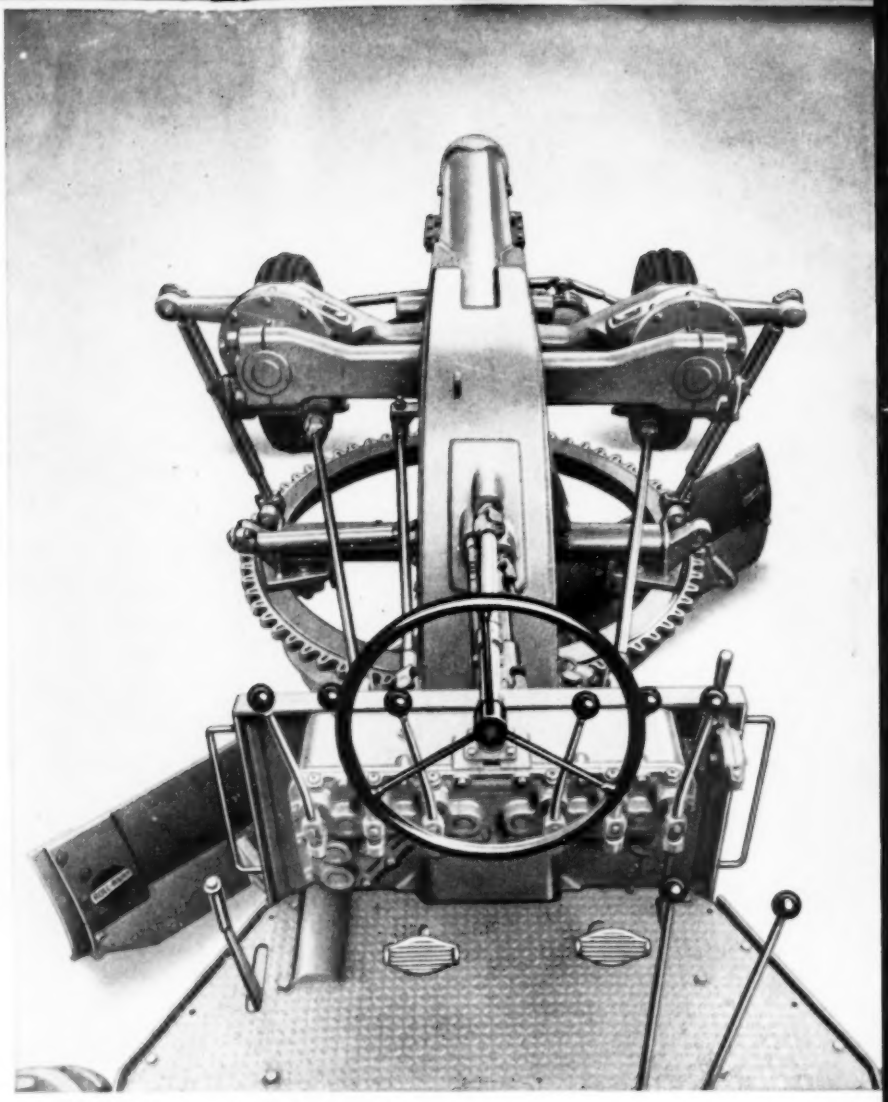
A MOTOR grader operator has to be able to see his work to do a good job, whether he's rolling big windrows or doing highly accurate finishing.

Here is how Allis-Chalmers engineers made sure the new AD-40 met these requirements. They carried A-C's single member frame all the way from the front axle to the platform; cut down the size of the lift cases to eliminate blind spots; lowered the control box and eliminated assemblies from the front panel to provide better visibility of the work area directly in front of the operator; tapered the front edges of the platform so that he could see both ends of the moldboard as he works.

A-C fieldmen also knew that a grader operator likes to sit down whenever the job permits. So they've not only given him ample leg room for stand-up operation but also a steering wheel of adjustable height and a seat that rolls forward at a touch for sit-down operation.

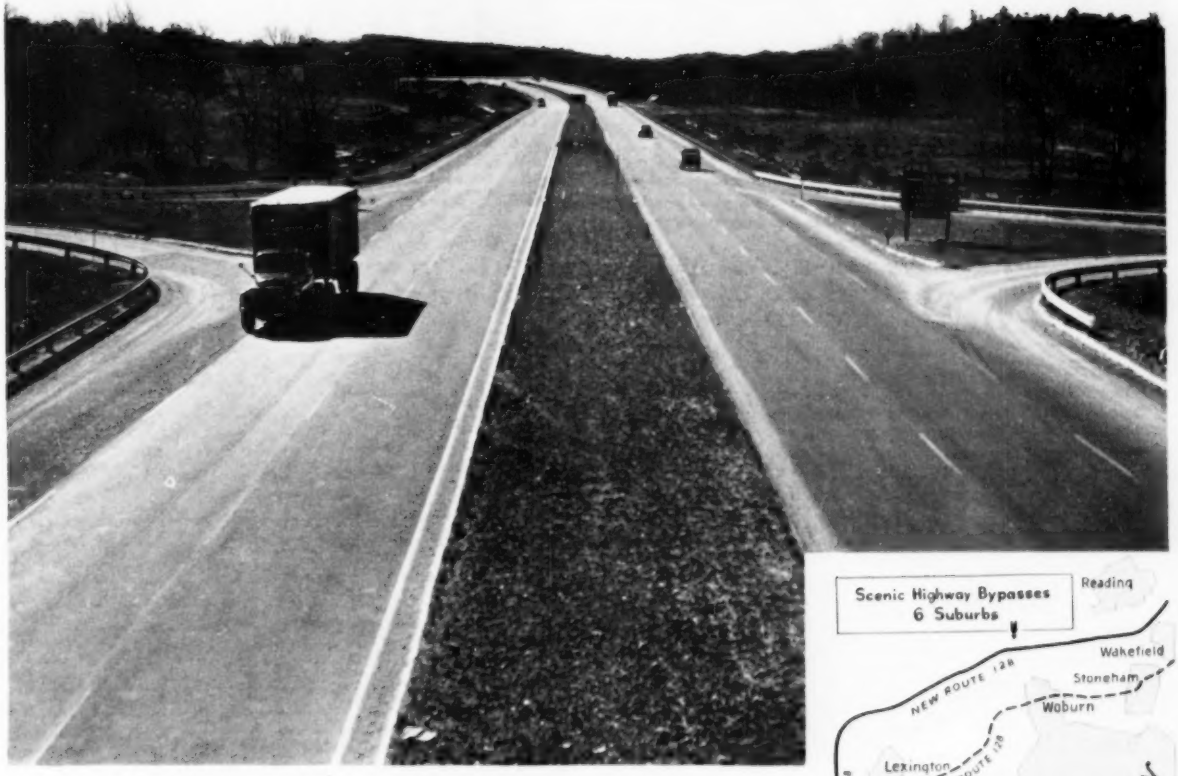
Combined with a new kind of power steering, these advanced design features are making Allis-Chalmers AD-40 an increasing favorite with operators and owners alike because it means more work done with less effort. For more facts on the AD-40, it will pay you to see your nearby Allis-Chalmers dealer soon.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



(above) Here is actual view operator has from platform of Allis-Chalmers AD-40, showing how well he can see both ends of the blade and both front wheels.

(below) The AD-40 has 104 brake horsepower, 23,000 pounds of weight and tandem drive traction, all it needs to do a better job on heavy duty construction . . . a faster job on maintenance.



New bypass helps motorists rim the hub in about 30 minutes. The new 4-lane highway also connects Worcester Turnpike with Newburyport Pike.

New Bypass Unsnarls Traffic in Boston Area

Not long ago, motorists using Route 128 outside of Boston had to tackle traffic in six suburbs. This meant a slow, tortuous 70-minute trek through city streets filled with cars and trucks.

Today, a new 4-lane highway helps motorists rim the hub in about 30 minutes. For this reason, approximately a million cars a month now use the new, 22-mile Northern Circumferential Highway.

This new highway was completed by seven contractors at a cost of $18,000,000. Bethlehem furnished structural steel, reinforcing steel and guard rails.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

Here's a good example of the work state highway departments and roadbuilders are doing to relieve congested highways throughout the country. The new Northern Circumferential Highway eliminates congestion, saves tempers and time.

Old Route 128 ran through six Boston suburbs. New route relieves former congestion like this shown here on outskirts of Boston.

STEEL FOR HIGHWAYS

BETHLEHEM STEEL

Dowel Units • Reinforcing Bars • Guard Rail
Hollow Drill Steel • Spikes • Bolts and Nuts • Tie-Rods
Timber Bridge Hardware • Sheet- and H-Piling

ROADS AND STREETS

JUNE, 1953 • VOL. 96 • No. 6

Roads and Streets represents 61 years of continuous publishing in the highway field; combined with Engineering & Contracting and Good Roads Magazines, established in 1892

HAROLD J. McKEEVER, Editor-in-Chief
C. T. MURRAY, Managing Editor

CCA NBP

COL. V. J. BROWN, Vice Pres. and Coordinator
J. C. BLACK, Associate Editor

A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

Coming Articles

How Ohio Turnpike Design Protects Farm Tiling

Special design criteria were developed by a specialist with J. E. Griner Company, to assure that elaborately tiled fields would not be affected by turnpike grading.

Transportability of Big Equipment Rigs

A lot has been done to design tractors, scrapers, wagons and portable crushers so they can be moved by road or rail to the job despite weight and clearance restrictions.

How San Francisco Paves Steep Streets

Powell Street with its hair-raising grade is concrete paved with special broom finish. Details coming.

Bridge Pier Scaffolding Has Built-in Stairs

Unusual safety precautions were taken by Bates & Rogers Construction Corporation, in constructing the tall piers for Buffalo's downtown high-level expressway bridge.

A "Crossing Gate" Town Gets Grade Separations

Planning engineers concerned with eliminating urban bottlenecks, and contractors who respect resourceful methods, will want to read the story of Fostoria, Ohio.

Also . . .

New articles on snow and ice control and winter preparation. . . . Continuing series of roadside mechanization articles. . . . How an obsolete Texas road was modernized for high-speed traffic. . . . Lining methods for Gaviota Gorge highway tunnel, California. . . . A small town paves 37 blocks.

In This Issue

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Acceptance under Section 34.64 P.L.& R., Chicago, Illinois. Published monthly.
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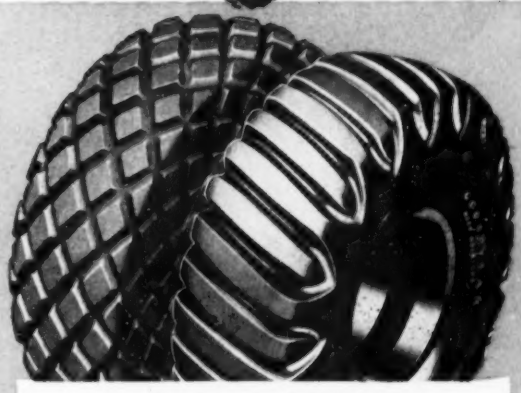
When the job calls for PULL

SURE-GRIP
Drive-wheel traction champ
for graders and scrapers.

here's the FIRST CHOICE tire

Sure-Grip in name, sure-grip in action—that's why this long-lasting Goodyear tire is the top favorite on earth-moving operations everywhere for drive wheels. Its specially engineered O-P-E-N C-E-N-T-E-R tread and extra-massive, balanced lugs are what make it the traction champ. *And cost-wise construction men know it.*



There's a Cost-Cutting Goodyear Tire For Every Job

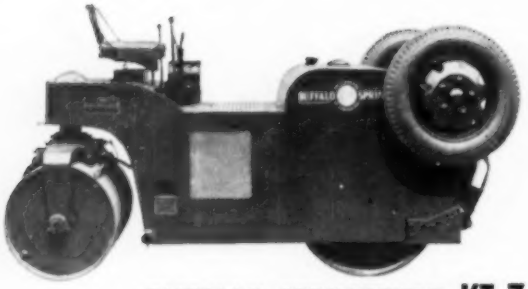
ALL-WEATHER
Finest for flotation, rolling big loads faster

HARD ROCK LUG
Super-tough champ for all kinds of rock work

Sure-Grip, All-Weather—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

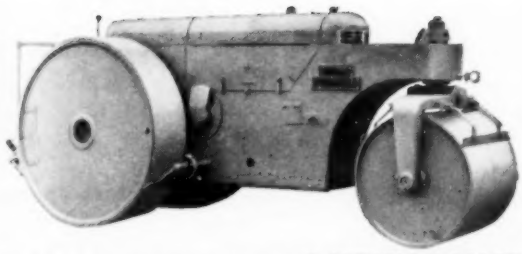
GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TIRES THAN ON ANY OTHER KIND



BUFFALO-SPRINGFIELD KT-7

World's most useful 3-5 ton portable roller! Ruggedly built, with guide and drive rolls of heavy steel plate. Compact 4-cylinder engine delivers 24.2 horsepower through a simple, troublefree two-speed transmission and famous Buffalo-Springfield bevel gear final drive. Easily rigged for towing, has built-in hydraulic jack to raise drive roll. Ideal for driveways, parking lots, road and street maintenance. Ask for Bulletin S-58-49.



BUFFALO-SPRINGFIELD 3-WHEEL ROLLER

Heavy-duty engineered for continuous service on toughest jobs. Features that give you wide job versatility . . . Exclusive 4-speed transmission to provide a *continuous* range of roller speeds from 1.1 to 5.0 mph, *all at full engine power*. Machine-finished ballast-type rolls. High-speed, low-torque clutches for even, smooth reversing. Many more. Models for weights from 5 to 17 tons. Ask for Bulletin S-60-50.

LOOK HERE

FOR THE ANSWER TO YOUR COMPACTION PROBLEM

BUFFALO-SPRINGFIELD C-MODEL TANDEMS

Feature engineering advancements offered by no other 2-axle tandems. New open grill allows operator to see drive roll from normal seated position, makes it easy to work close to curbs and shoulders. More ground-to-frame clearance than ever—increased to 17″ on 5 to 9 ton tandems, 20″ on 10 to 16 ton tandems. Rolls close to high curbs, forms and other obstructions. Exclusive 4-speed transmission provides full governed horsepower at all speeds from 1.1 to 5.0 mph. Heavy armored housing protects transmission and famous Buffalo-Springfield bevel gear final drive. These and many more profit-potential features make the C-Models your best buy in 2-axle tandems. Ask for Bulletin S-61-53.

There's a Buffalo-Springfield Distributor Conveniently Located to Serve You

Ask your distributor for complete description and specifications for model meeting your requirements—or write to us

BUFFALO-SPRINGFIELD ROLLER COMPANY

BUFFALO SPRINGFIELD

THE STANDARD OF COMPARISON

THE LEADER IN ROAD ROLLER DESIGN AND MANUFACTURE

PLENTY OF POWER *FOR* BIG PRODUCTION

THE Ronald Kenyon Construction Company of Des Moines requires a lot of hot mix asphalt every hour, to resurface U. S. 34, east of Ottumwa, Iowa. The big Madsen 3000-pound asphalt plant shown above does the job, and a Cat* D375 Electric Set supplies power for the entire plant. The engine works hard eight hours a day, 24 days a month. Superintendent Henry Wilson is thoroughly satisfied with his Cat equipment. It asks no quarter and requires minimum maintenance—a common quality of the whole Caterpillar line.

Caterpillar Diesel Engines and Electric Sets are easy to operate. They deliver full power without fouling using No. 2 furnace oil, and are available in 12 sizes up to 500 HP and 315 KW. Installation is quick and easy.

See your dealer. Get the whole story *and* on-the-job proof.

CATERPILLAR, Peoria, Illinois.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

24 MIX SELECTIONS

with "repeater" for automatic re-batching

Fully automatic and completely flexible, this Johnson Transit-Mix Plant produces 24 different size and type batches of aggregates and cement for a commercial ready-mix company at Covington, Ky.

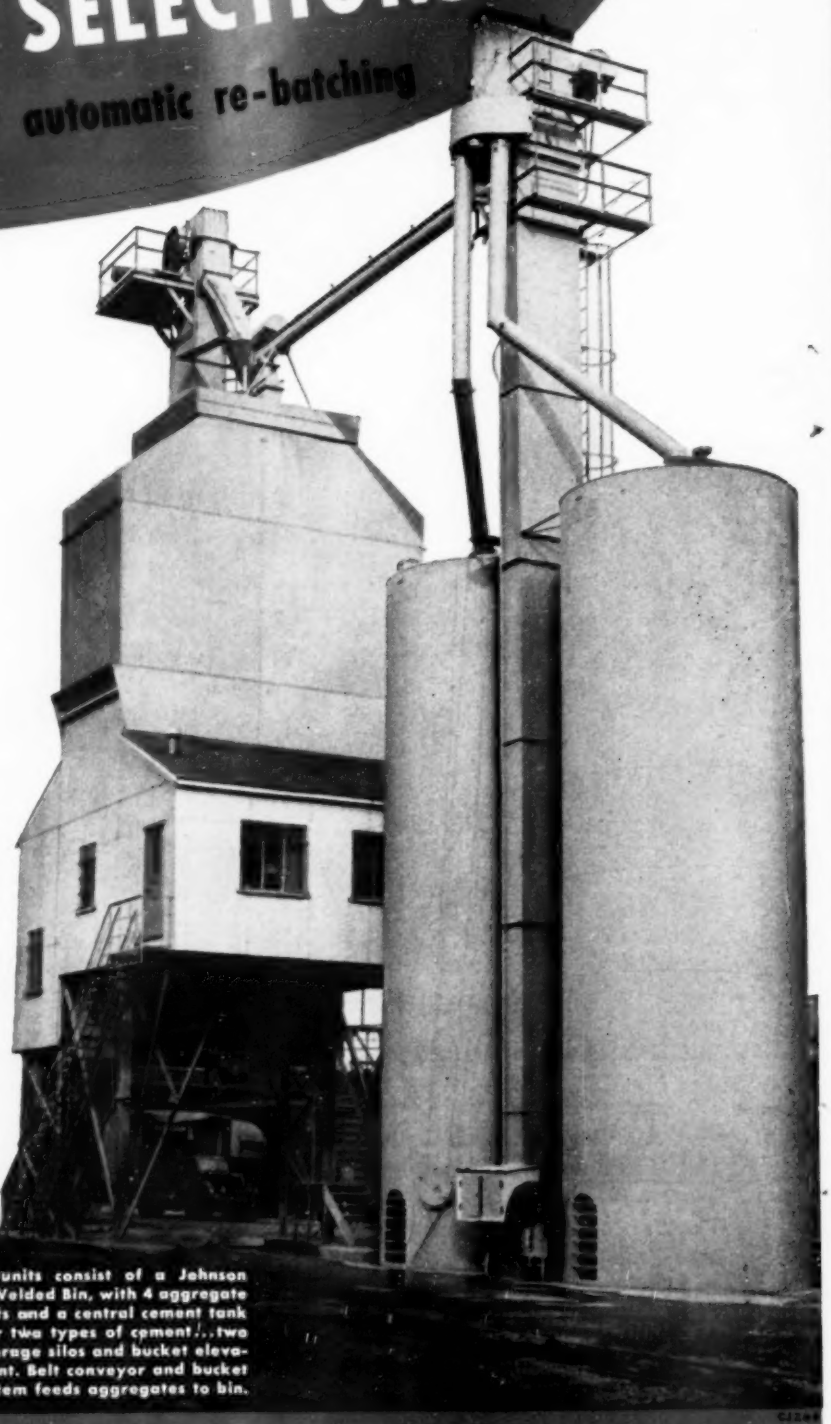
Dial on a 24-mix-selector panel provides for 2500-lb. or 3000-lb. (per sq. in.) concrete in ½, ¾ and 1-yard batches. On each size batch there are four individual selections for 3, 4, 5 or 6-inch slumps. This makes it easy to change from one type of batch to another as needed. A "repeater" provides for continued automatic batching of any one selection for a pre-determined number of times. Operator simply sets the mix selector, sets the "repeater", pushes the "start" button . . . and the plant weighs out batches fast, accurately.

Plant is equipped with a 2500-lb. sand batcher . . . three 2500-lb. aggregate batchers for fine, medium and coarse aggregates . . . a 2000-lb. water weigh batcher . . . and a 2000-lb. cement batcher with dual fill valves for selecting two types of cement. All are fully automatic, and are controlled by the Central Dial Scale Unit with pen recording of the weight of each single-material batch.

Check the increased efficiency you can get on your transit or central-mix operations with Johnson plants and accessory equipment. See your Johnson distributor, or write us.

C. S. JOHNSON COMPANY

CHAMPAIGN, ILLINOIS • (Koehring Subsidiary)

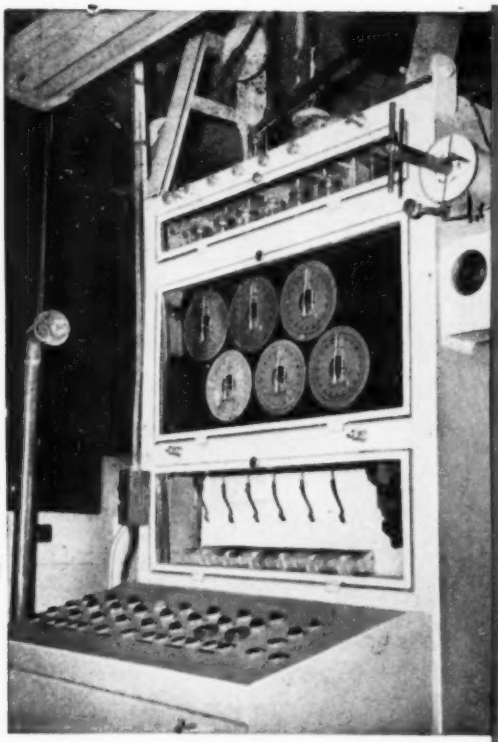


Main plant units consist of a Johnson 200-yd. All-Welded Bin, with 4 aggregate compartments and a central cement tank arranged for two types of cement . . . two 1032-bbl. storage silos and bucket elevator for cement. Belt conveyor and bucket elevator system feeds aggregates to bin.

JOHNSON KOEHRING PRODUCT

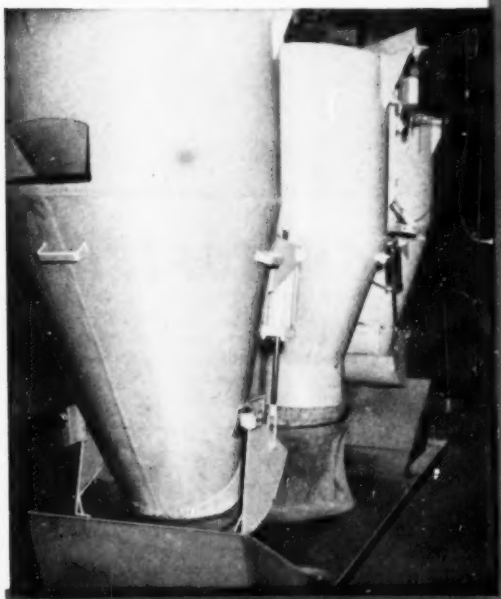
JOHNSON CONCRETE PLANTS

BINS • BATCHERS • HOPPERS • SILOS • ELEVATORS • CHARGERS • CLAMSHELL, CONCRETE BUCKETS



Central Dial Scale Control Unit

on Johnson Transit-Mix Plant at Covington, Ky., is complete with time and date stamp, relays, push buttons, lights, etc., for fully-automatic operation. Graphic recorder shows "full" and "empty" weight of weigh hopper to make sure a complete batch is weighed out on each material.



Single-Material Batchers with steep bottom slopes discharge in 15 seconds. Introducing materials into the transit-mix trucks in small batches has a pre-mixing action . . . and helps reduce

20-FT.-PER-MIN. Parsons 88 Trenchmobile®

Rubber-tired Trenchmobile drives job-to-job at 12.6 m.p.h. . . . digs 8 or 12 in. wide, 5 ft. deep, up to 20 ft. per min. Sloping ladder boom makes vertical set-ins, undercuts sidewalks, curbs, old mains. Other features: hinged crumber, "Tap-in" digging teeth, reversible conveyor, optional backfill blade. Also ask your Parsons distributor about the 2 wheel-type and 3 ladder-type Trenchliners® . . . all full crawler mounted.

PARSONS (Koehring Subsidiary)
Newton, Iowa

FAST GRAVITY DUMP with Kwik-Mix Moto-Bug®

Moto-Bug has instant gravity dump with snub-line control . . . no body hoist mechanisms. This 10 cu. ft. power wheelbarrow also has full power forward and reverse . . . no push, no pull necessary to travel, back, or spot. Climbs 20% ramps fully loaded. Has interchangeable 1500-lb. flatbed, 500 or 1000-lb. fork lift, also scraper blade. Other Kwik-Mix units: 3½-S to 16-S Dandie® concrete mixers, bituminous and plaster-mortar mixers.

KWIK-MIX (Koehring Subsidiary)
Port Washington, Wis.

NO TURN at loader with Koehring Dumptor®

Fast-shuttling Koehring Dumptor® eliminates slow turns at loader, on narrow haul roads, and at the dumping location. With constant-mesh transmission, Dumptor travels same speeds forward and reverse . . . gets its load, drives to fill, dumps and returns to loading unit without turning. Eliminating only 2 turns saves ½ minute on every cycle. Instant gravity dump cuts another 15 to 25 seconds off haul cycles with heavy-duty Dumptors.

KOEHRING COMPANY
Milwaukee 16, Wis.

Y66

P&H MITI-MITE

ready for any job—anywhere!

GETS AROUND FAST TO LICK HIGH COSTS!

Wherever your jobs may be — 4 blocks or 40 miles away — MITI-MITE gets there in a hurry and does them in a way that means lower costs on every one. It makes new opportunities for you.

That's because MITI-MITE is engineered throughout for truck service *exclusively*. Every operating feature — every detail — down to the final simplicity of mounting on suitable truck — has been properly engineered for the purpose. It's simpler, more practical, more powerful; requires far less servicing.

And, with all this, MITI-MITE has the extra stability that lets you put more on the hook — apply more power at the tooth point. It means greater safety — greater speed — greater work capacity. It's fully convertible, of course. Ask your P&H dealer for complete details about MITI-MITE. Write for literature.

P&H TRUCK CRANE DIVISION
HARNISCHFEGER CORPORATION
Milwaukee 46, Wisconsin

See your P&H Dealer!

MITI-MITE

What Do American Highway Officials Think of RUBBER ROADS?

A recent independent survey of American Highway Officials in regard to their attitudes toward rubber roads produced some impressive and significant responses.

Citing "rubber" as the most important new development in highway surfacing, city and town highway engineers pointed to "longer wear and life" as the chief advantage of rubber-asphalt roads, and 72% of them said that if funds were available, they would recommend the laying of a test rubber road in their locality.

Most impressive of all — *one-third* of all the highway officials are already convinced that the addition of rubber to asphalt paving will become a *standard* method of highway construction.

To *prove* the value of rubber roads in stretching the highway dollar, highway engineers from coast to coast are laying test strips of natural rubber roads this year in their communities. It is possible to "pave a block" with natural rubber-asphalt top surfacing for an added cost of less than $500 for the average block. Such tests will prove to the local highway engineer just how much he can save on repairs and maintenance over a period of years by adding natural rubber powder to the asphalt top surfacing of his roads.

Write for a copy of this interesting survey showing in detail what the American highway engineer thinks of rubber roads.

Natural Rubber Bureau
1631 K Street, N. W., Washington 6, D. C.
Natural Rubber Bureau Research Laboratory, Rosslyn, Virginia

Natural Rubber Bureau
1631 K Street, N. W., Washington 6, D. C.

Please send me . . .

- ☐ Copy of new survey report on rubber roads.
- ☐ Copy of booklet "Stretching Highway Dollars with Rubber Roads."
- ☐ Information about laying a test road of natural rubber-asphalt paving.

Name .....

Title .....

Street .....

City ..... State .....

Paving the way for savings

● When you use asphalt construction or resurfacing for city street or highway, you're paving the way for real savings in time and money. When you use Standard Oil asphalt you're gaining even greater road-building economy.

You save time because easier laying of asphalt, use of lighter and faster equipment, and the rapid setting of asphalt all help to speed road construction.

You save money because faster paving means fewer man-hours and lower labor costs. Local aggregate can be used to keep material and material handling expenses at a minimum. The durability of asphalt paving brings savings in the long run. Asphalt and heavy aggregate, mixed, make strong road foundations. Top courses of asphalt, stone, and sand present long-wearing, waterproof surfaces. Maintenance, when necessary, takes a minimum of time, labor, and materials.

You add further to these savings by using Standard Oil asphalt. With five asphalt-producing refineries located throughout the Midwest, Standard makes the haul to your site a short one. Prompt, reliable shipments eliminate work delays. Freight costs are at a minimum. A Standard Asphalt Representative will be glad to work with you on your job needs. For his services, write: Standard Oil Company (Ind.), 910 S. Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL
ASPHALT

STANDARD OIL COMPANY STANDARD *(Indiana)*

SPREAD HARSH DRY CONCRETE FAST

BLAW-KNOX CONCRETE PAVING SPREADERS

with the Automatic Transverse Blade

MODERN harsh, dry mixes of 1½" to 3" slump concrete are extremely difficult to spread manually or by makeshift methods with speed and economy. That's why Blaw-Knox Spreaders have become standard equipment in so many high-speed paving operations. This Spreader with the Transverse Blade is the *only* spreader that automatically moves the concrete longitudinally and transversely at the same time, spreading it uniformly to the width and elevation required, no matter where it is placed on the subgrade.

A Vibratory Attachment may be added to compact the concrete simultaneously with the spreading operation, increasing its density and strength and insuring dense pavement edges, free from honeycomb. Blaw-Knox Spreaders easily keep pace with the output of two 34-E pavers.

Available in two standard adjustable widths—10′ to 15′ and 20′ to 25′.

ASSURE A SMOOTH-RIDING FINISH

BLAW-KNOX FINISHING MACHINES

This double-screed pavement finisher assures high daily production and a smooth-riding finish regardless of the type of concrete mix used. Its rigid and sturdy structural frame is combined with proper weight distribution to minimize weaving and lateral thrust on the side forms, even when operating on concrete that is dry, harsh and difficult to manipulate. The large, wide front and rear screed ends prevent wastage of concrete over the side forms. Both standard sizes—10′ to 15′ and 20′ to 25′—are easily and quickly adjustable for width. Screeds are telescopic.

Blaw-Knox Finishing Machines are available with a Vibratory Attachment for consolidating and compacting difficult mixes of concrete, assuring a smooth finish while maintaining maximum production schedules.

MECHANIZE THE ENTIRE JOB FOR...

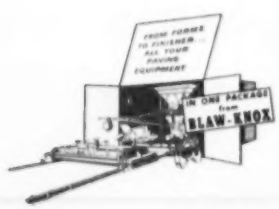
HIGH-SPEED, LOW-COST CONCRETE PAVING CONSTRUCTION

Mechanization is the key to greater efficiency and economy in modern concrete paving operations. And the key that opens the door to greater profit on *your* job is 100% mechanization with the Blaw-Knox "Complete Package" of concrete construction equipment, developed to bring unified, balanced, "assembly-line" methods to road building operations. The Blaw-Knox "Complete Package" of cost-cutting equipment contains every piece of equipment you need, from forms to finisher, to give you the step-by-step mechanization that assures high-speed, low-cost concrete paving construction.

Blaw-Knox is your *only* source for a completely mechanized outfit . . . a one-responsibility "package" available on one order, in one shipment and with only one financial arrangement. One responsible distributor organization simplifies maintenance and supply of genuine factory replacement parts. One Blaw-Knox trained man can service *all* your "package" equipment. Start mechanizing your paving outfit today to get your share of the big jobs. See your nearest Blaw-Knox distributor for complete details.

USE THE BLAW-KNOX *"Complete Package"*
of concrete paving equipment

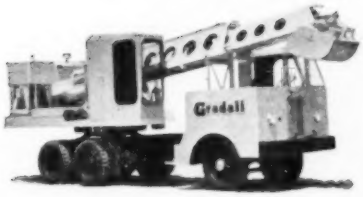
It includes: Clamshell Buckets • Aggregate and Cement Batching Plants • Steel Road Forms • MultiFoote Concrete Pavers • Precision Subgraders • Concrete Paving Spreaders • Finishing Machines



BLAW-KNOX

BLAW-KNOX EQUIPMENT DIVISION
Blaw-Knox Company
Farmers Bank Bldg. • Pittsburgh 22, Pa.

NEW YORK • CHICAGO • PHILADELPHIA • BIRMINGHAM • WASHINGTON • SAN FRANCISCO



With the multi-purpose Gradall you can do it...

BETTER...

Yes, the Gradall operator has such complete control of the telescoping boom and wrist-like action of the tool that jobs are not only done better, but often to hand finish "specs". Here the Gradall's positive down pressure enables the operator to dig small holes—deep and neat—and a straight, narrow trench, ready for pouring foundation footings without any additional forms. Such accurate work is not confined to the "wide open spaces", because the Gradall works in many tight places, even inside buildings, completely inaccessible to other machines.

FASTER...

Where other machines falter, the Gradall's speedy arm-action and positive down pressure really go to work! For instance, in ripping asphalt pavement one attachment scores the pavement. Then with a second attachment the Gradall removes large chunks, swinging around to load into trucks—all in one pass. Pavement is removed right down to the sub-surface, eliminating clean-up hand labor. Similarly, it removes grouted brick so smoothly that most of the brick can be reclaimed.

FOR LESS...

When one machine can replace several machines, or as many as 40 hand laborers—and do the job better and faster—savings are bound to mount! A quick, easy change of attachments makes the Gradall an entirely "new" machine, enabling it to often do all of the phases of a complex job. On the job illustrated, it cut this slope to the exact desired angle, dug ditches for drains, and handled other work accurately and fast—without hand labor. Yes, the Gradall is a cost-cutter on all kinds of jobs!

Find out how a Gradall can make money for you! Contact your Gradall Distributor for a field demonstration.

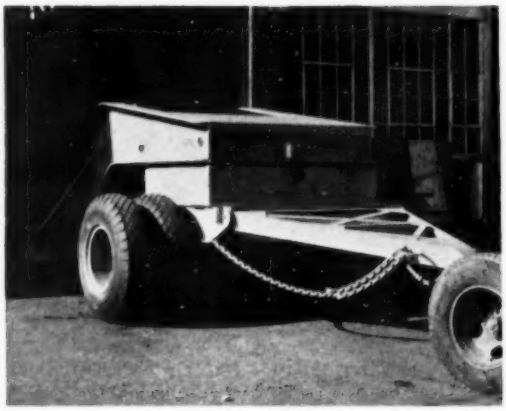
Gradall
DIVISION OF WARNER & SWASEY *Cleveland*
PRECISION MACHINERY SINCE 1880

Gradall Distributors in over 75 principal cities in the United States and Canada

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

BIG and TOUGH

Giant 100-ton Dorsey MTS built for Contractor on Atomic Energy Commission project



DORSEY TRAILERS

HEAVY-DUTY LOW BED TRAILERS 15 TO 75 TONS
(up to 100 tons on special order)

TILT-TO-LOAD TRAILERS

OIL FIELD FLOATS

For safe transportation of huge items of delicate electrical equipment and process apparatus for uranium 235 production, F. H. McGraw & Company uses this special Dorsey Low Bed. It's 87 feet long and 12 feet wide and the rear tires are 16 ply, 12.00x20.

Call your Dorsey Distributor—or Wire us collect

Dorsey Trailers—Elba, Alabama

You?...

a Doubting Thomas?

IF YOU'RE a man who has to be shown, we're right in your corner. Just give Roebling "Blue Center" Steel Wire Rope one try... see for yourself how it saves time and costs you less on the job.

Two out of three wire rope users in excavating and construction prefer Roebling rope. Call the nearest Roebling office for a Field Man to suggest the best ropes for your purposes.

ROEBLING [CF]
A subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE TRENTON 2, N. J.

Your metal culverts will have the best possible finish when you use Armco End Sections. They meet all the requirements for modern culvert end treatment.

With Armco End Sections there are no obstructions above the shoulder grade—an important safety feature—and nothing to hinder maintenance operations such as mowing and snow removal.

Greater efficiency is another advantage. On the upstream end Armco End Sections prevent scouring and reduce entrance loss. Downstream they retard undercutting.

Equally important, the installation of Armco End Sections is simple and fast. Regular crews quickly attach them to metal pipe or pipe-arch culverts with sturdy connectors. No special tools, formwork or follow-up operations are needed.

Armco End Sections are supplied for pipe diameters from 12 to 48 inches and for pipe-arch from 18 x 11 to 72 x 44 inches. Write for complete data. Armco Drainage & Metal Products, Inc., 3433 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. In Canada: write Guelph, Ontario. Export: The Armco International Corporation.

do your culverts come to a good end ?

ARMCO END SECTIONS

Adams performance pays off for contractor on 33½ mile road job!

● Easter & Schroeder, Inc., of Griswold, Iowa, are experienced road builders—built 33½ miles of farm-to-market roads last year. With scrapers roughing in the elevations (pictured) two Adams 100 h.p. graders built every mile . . . Mr. Easter, who can grade to "blue tops" with any of them, says he likes his Adams machines because of their "power, easy operation at all times" and because "you can see what you are doing." Bill Hoover, operator, backs him up. Both say that their

On heavy grading, like this, Adams graders quickly show their unequalled capacity —their ability to do more work per dollar of operating cost . . . Prove them on your own jobs.

Adams machines will do more work, operate easier and faster than other popular makes of graders they have used. They compare by experience—and they're in business to make money.

Why don't you try a new, improved Adams? Let your local Adams dealer demonstrate one on your work. Phone him today.

J. D. ADAMS MANUFACTURING CO. • INDIANAPOLIS

Make your next motor grader an

ADAMS

Dozens of Uses • Thousands of Users
Prove Ability, Versatility of the Model D

40 Brake hp. • 8,800 lb. (bare)
Four speeds forward to 25.6 mph., reverse to 3.3 mph.

The thousands of satisfied owners are still finding new uses for the able and versatile Allis-Chalmers Model D Grader. It has proved again and again that it has the power and capacity to do outstanding work on both construction and maintenance.

Usefulness of the Model D is multiplied by several easily mounted attachments: hydraulically controlled rear-end loader, shoulder maintainer that is interchangeable with the loader, scarifier, both V-type and blade snowplows.

MORE POWER, NEW FEATURES, LOW COST

For even greater performance ability, power for the Model D has been boosted to 40 brake hp. Also, leaning front wheels and power circle turn now are available (optional). With these and other big-grader features such as tandem drive, ROLL-AWAY Moldboard, tubular frame and hydraulic blade lift — the Model D's original cost still is but one-third that of a large grader. Operating costs are low, too.

Your Allis-Chalmers dealer will be glad to demonstrate what the versatile, economical Model D can do for you.

ROLL-AWAY is an Allis-Chalmers trademark.

ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

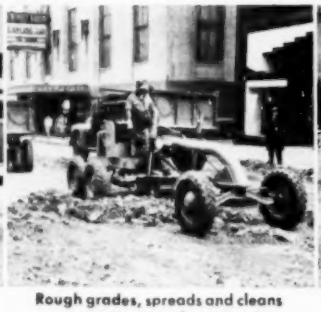
...for contractors

Finish grades between forms on road and street construction.

Levels for home building, parking lots, play areas, etc.

Terraces, builds diversion ditches, does miscellaneous grader work.

Loads sand, gravel, dirt, any material, with ⅝-yd. bucket.



Rough grades, spreads and cleans up on street or road construction.

Landscapes, grades lawns, slopes, ditches around housing projects.

...for county and state highway departments

Scarifies with plenty of down pressure, accurate hydraulic control.

Mixes thoroughly, with rolling action of ROLL-AWAY moldboard.

Cuts and cleans ditches, slopes banks, grades shoulders.

Reshapes and maintains shoulders with rear-mounted attachment.

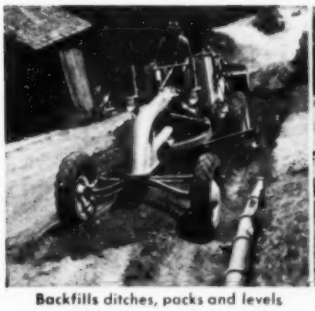
Loads sand, dirt, snow—any material — to trucks.

Keeps roads in shape the year-round — clears snow in winter.

...for cities towns and townships

Maintains streets and alleys, park drives, playgrounds.

Handles light construction on streets, roadways, etc.



Backfills ditches, packs and levels ground, loads excess dirt to trucks.

Removes weeds from street sides and alleys, loads or hauls away.

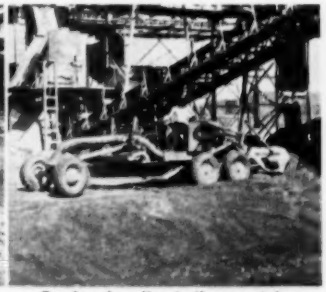
Windrows snow with blade, or plows with V or blade plow.

Loads snow from gutters, maintains stockpiles, handles bulk materials.

...and others

Builds and maintains access roads for quarries, cemeteries, etc.

Clears and loads snow at quarries, storage yards, parking areas.



Grades, handles bulk materials around industrial plants.

Spokane Highway Department Loading Gravel with a "QUICK-WAY"

"QUICK-WAY"

Reg. U.S. Pat. Off.

WORKS more jobs
SAVES more time
SAVES more money
for Cities, Counties and States

"QUICK-WAY", the original truck shovel and still the leader, has for 30 years been a vital tool in saving money and speeding work for Cities, Counties and States.

A "QUICK-WAY" is a versatile piece of equipment that **fills a vital need** on most every type of public works project—handles so many different jobs, such as moving gravel and rock, laying or loading pipe, ditching, backfilling, repairing gas lines, handling materials, etc., with speed and efficiency and at lower operating and maintenance costs.

The "QUICK-WAY" is especially built for mounting on standard trucks, features low center of gravity, works easily over the side, gives easy, fast swinging, has plenty of reserve power, rugged all steel construction and numerous parts interchangeable for easy maintenance.

Michigan Consolidated Gas Company "QUICK-WAY" Unloading Pipe

Denver Municipal Water Department "QUICK-WAY" Laying Pipe

Fully convertible in minutes—an attachment for every job, trench hoe, backfiller, crane, shovel, clamshell, pile driver, dragline. 4 Models—¼ to ½ yard—3 to 10 ton crane capacity. Economical to buy. Send coupon today for full details.

Oregon Highway Department "QUICK-WAY" Digging a Drainage Well

"QUICK-WAY"
TRUCK SHOVEL CO.
Denver, Colorado, U. S. A.

Southern California Gas Company "QUICK-WAY" Repairing Gas Line

MAIL COUPON TODAY

"QUICK-WAY" TRUCK SHOVEL CO.
Dept. 137 • 2401 East 40th Ave.
Denver, Colorado • U.S.A.

Please send NEW 28 page, two color FREE book giving complete details on all four "QUICK-WAY" Models.

Name _____

Address _____

City _____ State _____

there's a *BIG* difference ...in this 3/4 yd. shovel!

Look beyond the dipper size when you investigate your next 3/4-yard shovel. Shovels may be rated the same, may even look alike, but that's where similarity ends when you look at the 3/4-yard Lorain TL-25.

Look into the cab to see if power flows directly and efficiently from the engine to the point of use, as it does on the "TL-25" . . . or *does* power wear itself out in long gear trains or in bending itself around corners?

Look to see if it has a great quantity of duplicate and interchangeable parts . . . does it have "packaged components" to permit quick switching of all major components. The "TL-25" *does* have these for easier service and quicker maintenance . . . another reason why it stays on the job longer.

Look at what it does on the job. *Dirt in the truck* means more than a whole slew of "talking-points". If you believe *actions speak louder than words,* you'll like the "TL-25" because it is on performance that it really shines. Your nearest Thew-Lorain distributor will be glad to prove these statements.

3/4 yards of power *plus* . . .

Whether gas or diesel, it goes to work directly . . . tears into the job . . . and consistently turns out profit-earning yardage.

3/4 yards of speed *plus* . . .

You can capitalize on every bit of "TL-25" power because in operation it responds with lightning speed, has high acceleration that kills "drag", and is a muscle-saver for the operator.

3/4 yards of endurance *plus* . . .

Anti-friction bearings, oil-enclosed gears, 5 identical shoe clutches, drop-forged hook rollers . . . and other items of highest quality materials and workmanship assure "TL-25" stick-to-it-iveness on the job.

3/4 yards of selection *plus* . . .

No other machine in *any* class offers such a selection of booms and mountings to hit your job right-on-the-button. Select from 4 crawler sizes, 7 rubber-tire mountings, 7 interchangeable booms.

THEW LORAIN® TL 25

THE THEW SHOVEL CO., LORAIN, OHIO

Hustles with

Railside commercial site prepared fast by pair of International TD-14As

"THEY'RE POWERFUL AND FAST," owner Harold J. Anderson tells reporter in describing the performance of his two TD-14As.

the Pay Load

"My TD-14As self-load six pay yards and deliver it faster than any crawlers the same size on the market."

That's the flat statement of contractor Harold J. Anderson, out on the job where his tractors are filling and leveling a building site at Minot, N. D.

Whatever size of crawler fits your needs, there's an International model that'll come through with power, maneuverability, and good steady work, day in and day out.

Here's what Anderson says on this point:

"I've been using Internationals for four years with very low maintenance and operating costs. In fact, my first International ran three full years with no downtime for repairs."

This kind of report comes from contractors all over the country—proof that International builds real dirt-moving machines that stand the gaff.

So see the International Industrial Distributor located near you. He has the full line of International crawlers—and as a nearby source of parts, trained servicemen and complete shop facilities, he can help keep your equipment easy on the overhead for years to come.

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

POWER ON PARADE. High-production International TD-14As self-load scrapers alongside burly freight engine as they prepare building site in Minot, North Dakota.

INTERNATIONAL HARVESTER

INTERNATIONAL

POWER THAT PAYS

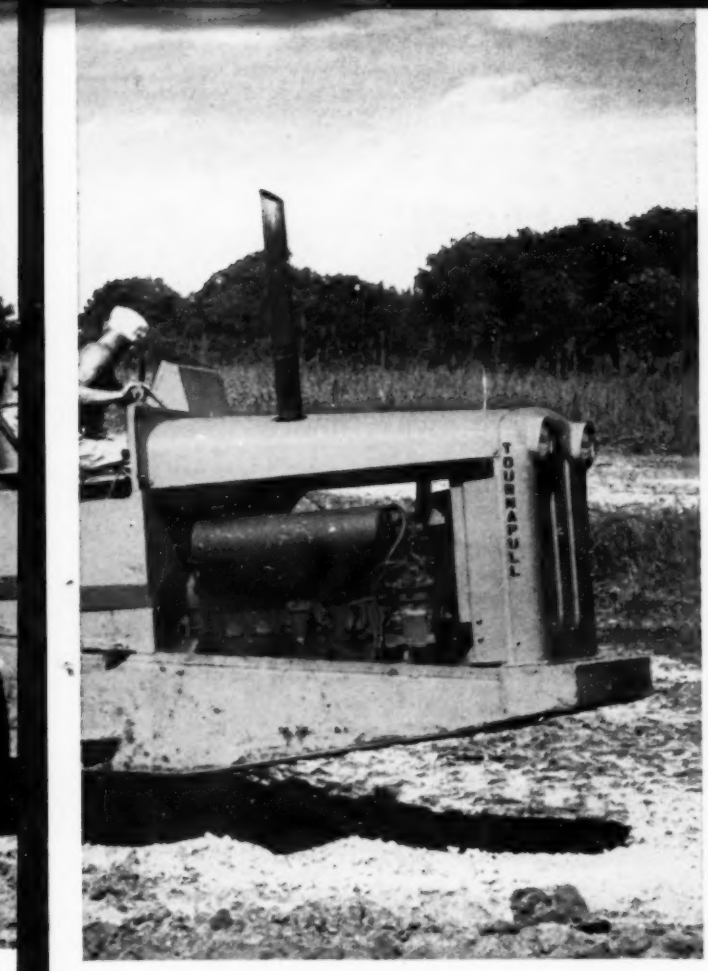
"C" spreads big load "on the run," brings road up to grade. High speeds also proved profitable driving to job. Tournapulls drove in under their own power . . . made the 3-mile trip through traffic in about 10 minutes.

2 C's move 44 loads per hour

Danens' Tournapulls continue dirtmoving well into winter until deep frost stops work. Shown here on another Minneapolis-area grading job, the "C" gets a heaping load of sod and topsoil while cutting down a hill.

J. A. Danens & Son, Inc., of Minneapolis, lick short hauls on sub-division roads with Tournapulls

Grading roads for sub-division in Minneapolis, J. A. Danens & Son, Inc., set a fast dirtmoving pace with 2 C Tournapulls. They obtained fill for the new roads by cutting into a large hill on the project site. In typical operation, the Tournapulls hauled 400' down 8 to 12% grades and returned up the same steep route. Each "C" completed a trip every 2¼ minutes . . . made 22 trips per 50-minute hour on the 800' cycle. Loads, according to field engineer estimates, averaged 12 pay yards



on 400′ haul

in sand and clay. That's 264 pay yards per hour for each "C" . . . 528 yards hourly for the 2 LeTourneau dirtmoving units.

Like Danens, you, too, will find that electric-control Tournapulls deliver lowest-net-cost-per-yard . . . in any kind of material . . . under any sort of working conditions. For proof, ask your LeTourneau Distributor for production figures from other jobs like yours. Better still, have him give you names and addresses of Tournapull owners near you. Talk to them, their superintendents and operators, before you buy your next scraper.

NOTE: **New C Tournapulls have 16-yard heaped capacity, 2 yards more than "C's" shown here.**

Pay off in winter

Verdie J. Volden of Farmington, Minn., used 2 electric-control C Tournapulls with a Tournatractor-pusher, as shown here, to raise and widen 3.3 miles of SAR 6 in Dakota County. Finished during the winter, this 50,000-yd. contract was the first of a series of road jobs handled in the past year by Volden's LeTourneau rigs. Pushing was easily synchronized for fast loading because all 3 units have instant gear change with constant-mesh transmission.

Haul sand in zero weather

To level a 20′ hill at a Minneapolis building site, Carl Bolander & Sons moved 10,400 cu. yds. of fine sand with their 2 C Tournapulls. Though handicapped by 0 to 15° temperatures and 6″ snow, the 2 rigs averaged 340 pay yds. hourly on 1300′ to 1500′ cycles. Loads, with 148 hp pusher, averaged 10 pay yds. each.

R. G. LeTOURNEAU, INC., *Peoria, Illinois*

DOW

THERE ISN'T ANY DUST ON A DOWFLAKE-TREATED ROAD!

DOWFLAKE keeps gravel roads from blowing away, makes them safer and protects surrounding area

Economy . . . safety . . . goodwill . . . all result from treating unpaved roads with Dowflake® (Dow calcium chloride 77-80%). And all are extremely important to road officials and the community.

Dowflake draws moisture out of the air, keeping the road damp, the dust down. Roads can't "blow away" due to heavy traffic and hard winds. This cuts down repeated gravel replacement, saves high material and labor costs.

Less dust means safer roads and better visibility. On Dowflake-treated roads motorists can see where they are going and traffic can safely move at a steady pace.

Housewives and farmers that live near unpaved roads appreciate the benefits of Dowflake, too. It keeps the house free of dust; laundry can be hung out without fear of its getting dirty. The farmer's crops grow better and bring more on the market when they aren't laden with dust and dirt.

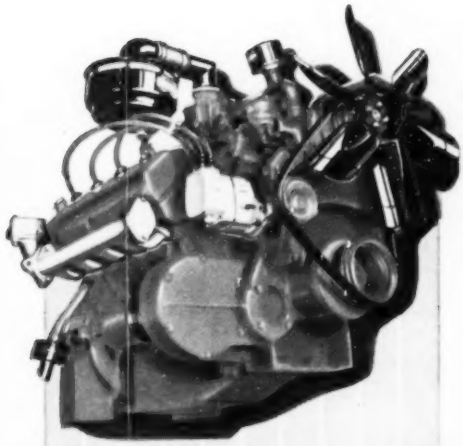
Write today and get the complete story on how Dowflake will make your roads more economical to maintain, safer to drive on and a credit to your department and your community. Inquire about Peladow®, Dow's new high-test, pellet-form calcium chloride (94-97%) also engineered for highway use. In addition to 100 lb. bags, Peladow can be shipped in bulk in closed hopper cars. THE DOW CHEMICAL COMPANY, Midland, Michigan.

you can depend on DOW CHEMICALS

DOW

Photo courtesy Hobart Brothers Company, Troy, Ohio

Chrysler horsepower on the ground for added Safety in the Air . . .



The moment the big plane stops and the pilot cuts the engines, the generators, which in flight supply electrical power to the batteries, stop too. But the electrical equipment in the plane—air conditioning, lights, radio, food containers, everything electrical—continue operating off the plane's batteries. Only for a moment, however. In that length of time a self-propelled and self-powered energizer takes over and supplies all necessary current, even starting the plane's engines when it's time to leave.

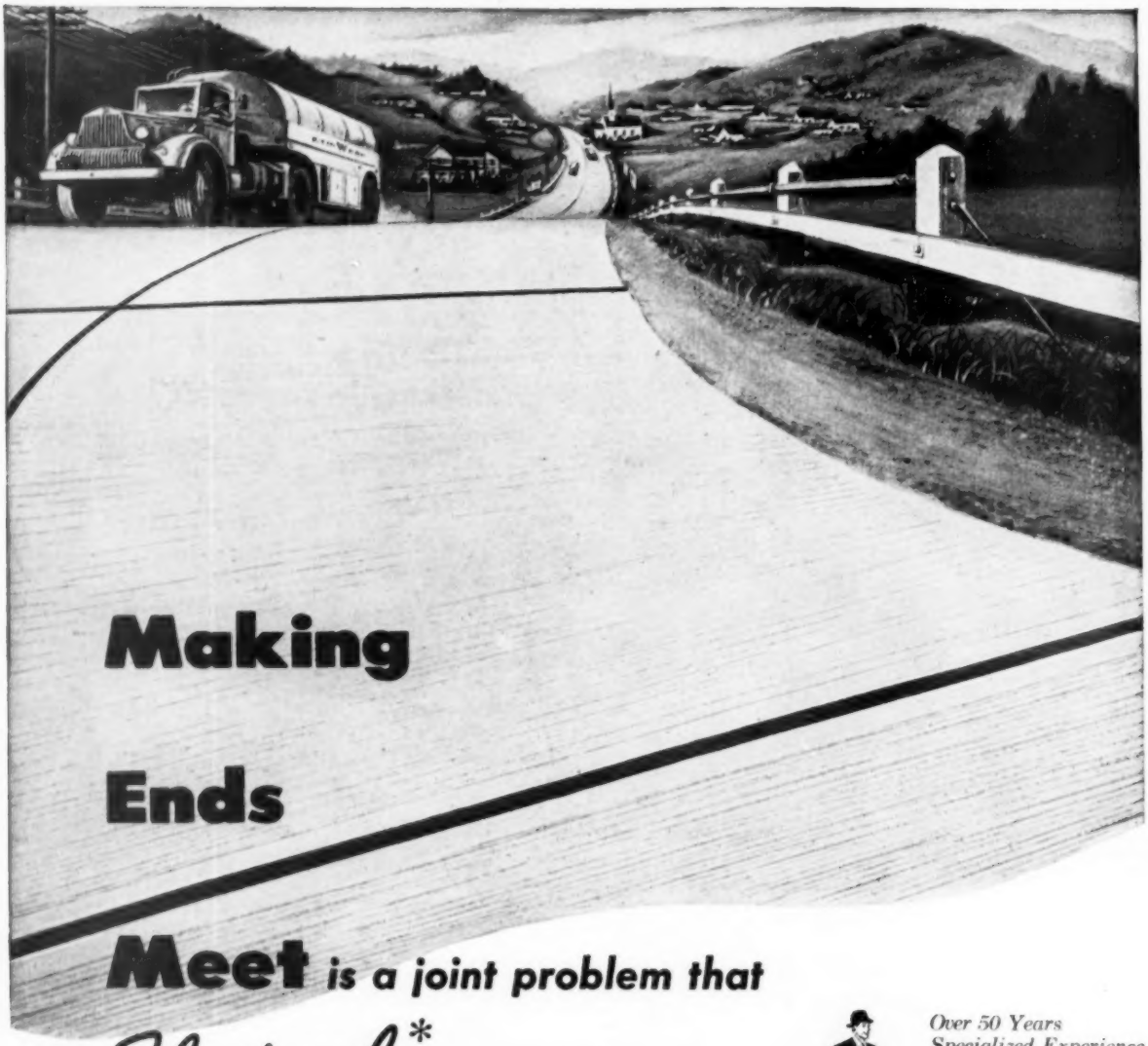
Among the most popular mobile ground power units are the "Power-Pull" units manufactured by Hobart and powered by Chrysler. The unit pictured uses the mighty 180 horsepower Chrysler V-8 Industrial Engine and can furnish 1000 amperes, 28.5 volts of direct current under continuous operation—enough to handle the electrical load of the largest aircraft. Power from the same engine propels the unit, enabling it to serve also as a towing tractor.

This is another in the long list of important uses of Chrysler Industrial Power. Whether your equipment requires V-8 or Six cylinder engines, Chrysler can supply them with gasoline, propane or natural gas burning carburetor, 3, 4 or 5-speed transmission and other optional equipment.

For your power needs, see a Chrysler Industrial Engine Dealer, or write: ***Dept. 126, Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.***

CHRYSLER
Industrial Engines

HORSEPOWER WITH A PEDIGREE



Making Ends Meet

is a joint problem that Flintseal* answers best...

...and most economically!

Over 50 Years Specialized Experience. At Your Service—by phone, mail or personal call . . . no obligation.

It's easier to keep within the limits of your pavement budget *when the joints are positively sealed.*

Count on it that your concrete will stand up better . . . become a good, lasting investment . . . when durable Flintseal is in the joints.

One application of this high quality hot-poured joint-sealing compound lasts for years. Flintseal holds its bond *firmly* . . . through extremes of hot and cold weather, against water and foreign matter.

You'll find that this rubber asphalt thermoplastic compound remains extensible and compressible through all cycles of concrete expansion and contraction. Therefore, in the long run, it's more economical than older types . . . appreciably reducing maintenance bills.

* Reg. U. S. Pat. Off.

Flintseal JFR, a special jet fuel resistant joint sealer, is also available for airfields.

Complete technical data and specification procedures are available on request. Write today for new descriptive folder.

THE FLINTKOTE COMPANY, *Industrial Products Division,*
30 Rockefeller Plaza, New York 20, N. Y.
55th & Alameda Sts., Los Angeles 54, Calif.
In Toronto, Ontario: THE FLINTKOTE COMPANY OF CANADA, LTD.
In London, England: Industrial Asphalts Company, Ltd.

FLINTKOTE
Products for Industry

TAKE THE GUESSWORK

out of your truck buying

Six-wheelers to meet tough schedules. New Model RF-210 Six-Wheel Truck with Super Red Diamond engine. Famous Comfo-Vision cab. Nine six-wheel models, GVW ratings 22,000 to 45,000 lbs.

International Trucks are proved all 3 ways

You take the guesswork out of truck buying when you buy International trucks. They are proved all three ways to give you the performance you want at the *lowest* cost:

1. **Proved Before They're Built.** Before any International truck model goes into production, the right balance between design, costs, and performance is developed and proved at International Harvester's new truck Engineering Laboratory. The results—longer truck life, reduced operating and maintenance cost—give you more truck for your dollar.
2. **Proved After They're Built.** Economy, performance, and stamina of Internationals is proved again at the "Desert Whipping Post," 4000-acre Proving Ground in Arizona, under the most difficult operating conditions.
3. **Proved In Service.** In 1952, America's most cost-conscious truck operators bought 58% more heavy-duty Internationals than any other make, 27.3% of all heavy-duty trucks sold. Every new International truck, from ½-ton pickups to six-wheel off-highway models, embodies the advanced engineering principles that have kept Internationals the heavy-duty sales leader for 21 straight years.

See them. Compare them. Drive them. Ask your nearest International Dealer or Branch for all the facts.

Select the International That's Right for Your Job from America's Most Complete Truck Line. 168 basic models from ½-ton to 90,000 lbs. GVW rating . . . 307 new features . . . 29 engines, with widest practical choice of gasoline, LPG or diesel power, available to give the right power for the job . . . 296 wheelbases . . . Transmissions and axle ratios to meet any requirement . . . Thousands of variations for exact job specialization.

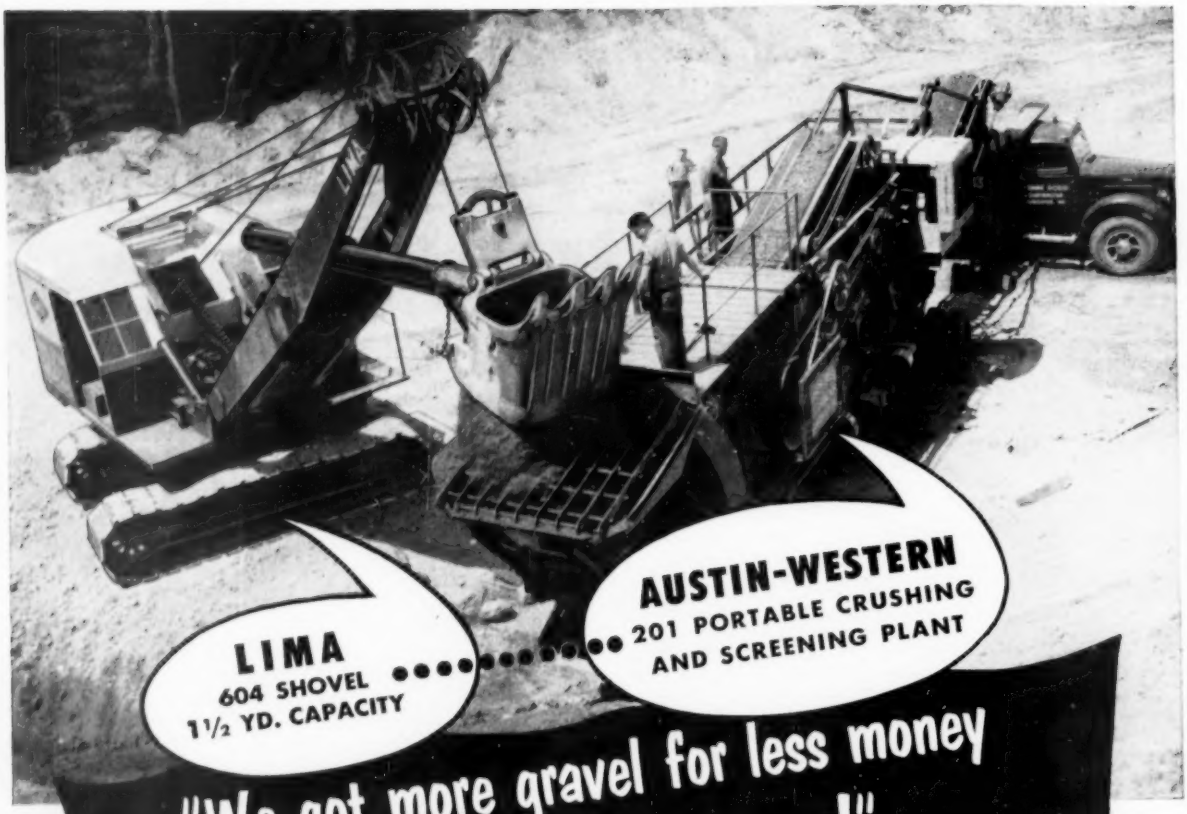
INTERNATIONAL HARVESTER COMPANY • CHICAGO

International Harvester Builds McCormick Farm Equipment and Farmall Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

Better roads mean a better America

INTERNATIONAL TRUCKS

"Standard of the Highway"



"We got more gravel for less money with this powerful team!"

...says CONTRACTOR FRANK ROSSI of Gardiner, Me.

"By teaming our LIMA shovel with our Austin-Western crusher, we made our own surfacing material for this new section of the Roosevelt trail . . . cutting time and costs by crushing and screening gravel on the job."

Such reports are not surprising when the teammates on the "production line" are these . . .

LIMA TYPE 604 SHOVEL—A convertible shovel (1 ½ cu. yd.), crane (30 ton) and dragline . . . very popular for road grading, quarry and gravel pit operations, and diverse construction and material handling work. Its air operated clutches and anti-friction bearings guarantee smooth, quick operation. Streamlined, counter-balanced design assures you greatest capacity per pound of weight.

AUSTIN-WESTERN "201"—Portable Crushing and Screening Plant with high production and low operating cost. The "201" excels in production because of its high operating speeds and exclusive design features, oversize conveyors and extra-large screening capacity.

THERE'S A LIMA-A.W. TEAM FOR EVERY JOB! There are ***LIMA shovels*** ranging in capacity from ¾ to 6 yards, convertible to cranes with capacities up to 110 tons.

There are ***Austin-Western*** crushing plants for any requirement . . . small portable units with single crusher and screen, multiple portable units, or stationary crushing and washing plants . . . each giving you maximum production at minimum cost.

Note: Austin-Western Crushers are now being manufactured in Lima, Ohio, enabling us to maintain steady, top-quality production of crushers.

LIMA
SHOVELS • CRANES
DRAGLINES • PULLSHOVELS

BALDWIN BLH LIMA-HAMILTON
Construction Equipment Division

BALDWIN-LIMA-HAMILTON CORPORATION
Construction Equipment Division
LIMA, OHIO, U.S.A.

"Our Dodge trucks just go and go!"

. . . says **CHARLES BENDA,** *Owner, Chuck's Excavation Service, Chicago, Ill.*

"Contract hauling and excavation work can be rough work sometimes. You never know from one day to another what your next job will be like. That's why I need trucks that can handle any kind of job that may come up. And Dodge is my choice down the line!

"That Dodge power is as steady as a mule. It has the ability to pull full loads out of deep basement excavations, and the dependability to keep coming back for more. My Dodge trucks are plenty economical, too. I haven't found any other make that can come close to Dodge for good gasoline mileage!"

Why new DODGE *"Job-Rated"* TRUCKS are a better buy for Construction Men

HIGH-POWERED FOR HEAVY HAULS!

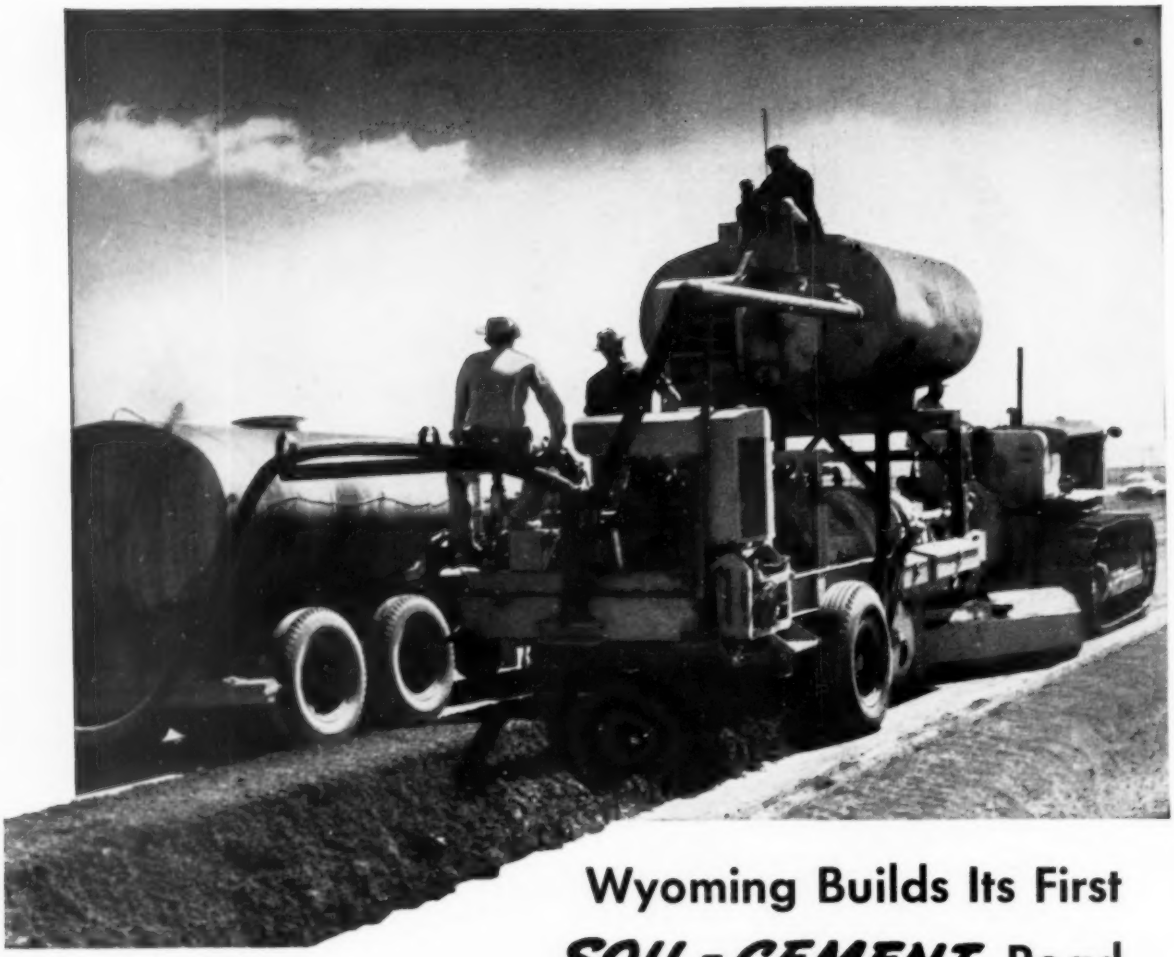
Dodge gives you the might and muscle to move those big loads *in a hurry!* Seven hefty power plants, three brand-new—from 100 h.p. to 171 h.p. It's real economical power, too. High compression ratios, 4-ring pistons, chrome-plated top rings and a host of other features combine to help keep your gas and oil expense at rock-bottom levels. And extra-powerful dual primary brakes, in 1- through 4-ton models, assure safer stops with less pedal pressure!

BIG PAYLOADS FOR BIGGER PROFITS!

With a Dodge "*Job-Rated*" truck, you can haul man-sized loads on a small-sized budget! New, bigger load capacities on many models enable you to carry more money-making payload every time out. Moreover, those rugged Dodge frames, sturdy axles and extra-strong springs are built to withstand toughest use for years without breakdown. See your Dodge dealer for the full story on Dodge extra value. He's making mighty good deals right now.

DODGE

"Job-Rated" TRUCKS



Wyoming Builds Its First *SOIL-CEMENT* Road

In building its first soil-cement road,* 17 miles long, Wyoming became the 45th state to use soil-cement. This also was the first time scoria was used as a soil in soil-cement paving.

Used alone, scoria, a shaly material forming the overburden of burned out coal beds, is not considered a good base material. But tests proved it could be combined with portland cement to make excellent soil-cement. The alternative was to build a gravel base requiring a 65-mile haul of acceptable material. By the use of soil-cement a saving of thousands of dollars per mile resulted.

This 17 miles of soil-cement pavement proved so satisfactory that it led to the paving of several blocks of streets in the city of Gillette. For this work the local scoria soil again was used.

Scoria thus extends the long list of miscellaneous materials, such as caliche, chat, chert, cinders, marl, slag, shale, brick waste and roofing granules, that have been used successfully in soil-cement in the 18 years since scientific controls were developed to insure dependable performance for this low-cost pavement for roads, streets and airports not subjected to heavy traffic.

Soil-cement pavement is economical because (1) most of the required material is soil on or near the site, (2) construction is fast and simple and (3) maintenance, as proved by experience on ever-increasing mileage, is low.

For further information about paving with soil-cement write for free, illustrated literature. It is distributed only in the U. S. and Canada.

*Soil-cement pavement consists of soil-cement base and bituminous surface

PORTLAND CEMENT ASSOCIATION
DEPT. A6-28, 33 WEST GRAND AVENUE, CHICAGO 10, ILLINOIS
A national organization to improve and extend the uses of portland cement and concrete through scientific research and engineering field work

BIG RED TEAM *

PAYS OFF WITH MORE PAYDIRT!

BIGGER LOADS EVERY TRIP . . .

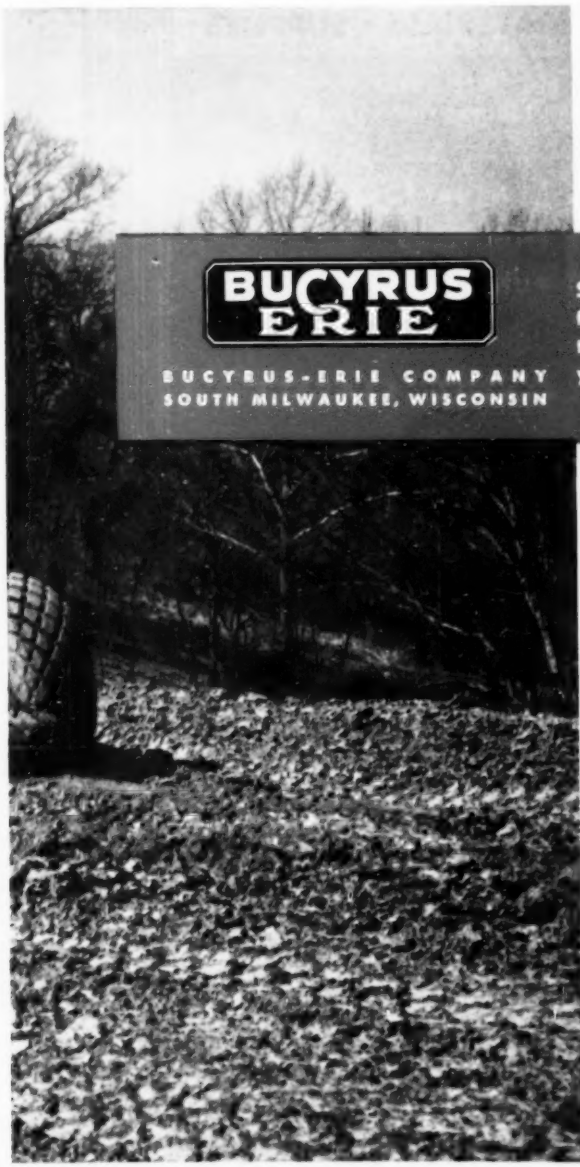
You get heaped loads faster with a Bucyrus-Erie scraper's boiling-action loading. This has been proved time and time again in actual field tests. The loading action breaks up big chunks to give you a compact and uniform fill, and extra pounds of dirt in every cubic yard.

MORE TRIPS PER DAY . . .

Big tires, low center of gravity and increased all around stability give you the flotation and maneuvering ability for extra trips every working day. The streamlined gooseneck permits short turns. Dumping is quick and clean with positive rolling ejection. It all adds up to faster hauling cycles . . . and more dirt moved per day.

11T53C

✻ Bucyrus-Erie scraper and TD-24 tractor



BUCYRUS ERIE

BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN

See your International Industrial Tractor Distributor soon for all the facts about the Big Red Team . . . it will pay you to use the equipment that delivers the most paydirt for your money.

THREE *B*-TYPE SCRAPERS TO CHOOSE FROM

Model	Capacity	
	Struck	Heaped
B-250	22 cu. yd.	27½ cu. yd.
B-170A	16 cu. yd.	21 cu. yd.
B-113	10 cu. yd.	14 cu. yd.

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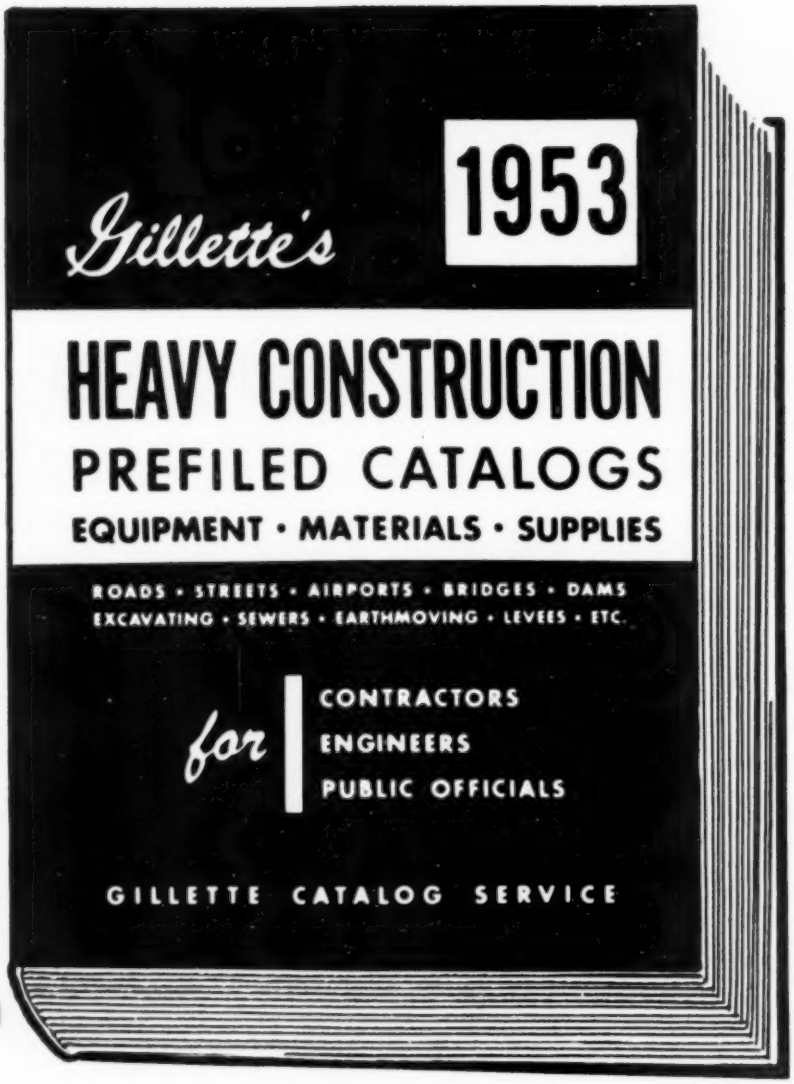

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Allis-Chalmers Manufacturing Co.
All Purpose Spreader Company
American Air Filter Co.
American Bosch Corporation
American-Coleman Company
American Manganese Steel Division
American Marietta Co.
American Steel & Wire
American Tractor Equipment Corp.
Anthony Company
Armco Drainage & Metal Products, Inc.
Arrow Manufacturing Company
Austin-Western Company

Baldwin-Lima-Hamilton Corp.
Badger Machine Co.
C. L. Ballard
Beardsley and Piper
Bicknell Manufacturing Company
Briscoe & Son, E. V.
Bros Boiler & Mfg. Co., Wm.
Buda Company, The
Buffalo-Springfield Roller Co., The
Butler Bin Company

Carey Manufacturing Co., The Philip
Carson Company, H. Y.
Carter Co., Ralph B.
C. H. & E. Manufacturing Co., Inc.
Chausse Manufacturing Co., Inc.
Cleaver-Brooks Company
Cleveland Fermgrader Co., The
Cleveland Frog and Crossing Co.
Cleveland Trencher Company, The
Clipper Manufacturing Co.
Clyde Iron Works
Concrete Surfacing Machine Co.
Crockett Brothers
Cummer & Son Company, The F. D.
Cummins Engine Company, Inc.

Davenport Besler Corporation
Detroit Diesel Engine Division
Dixie Tally-Ho, Inc.
Dorsey Trailers

Eagle Crusher Co., Inc.
Electric Tamper & Equipment Co.
Erie Steel Construction Company

Falker Manufacturing Co.
Fiske Brothers Refining Co.
Flexible Road Joint Machine Co., The
Flintkote Company, The
Foundation Equipment Corporation
Frace Manufacturing Co.

Galion Allsteel Body Company
Galion Iron Works & Mfg. Company
Gar Wood Industries, Inc.
General Excavator Co.
General Motors Corporation
Gledhill Road Machinery Co., The
Goodall Rubber Company
Gradall Division, Warner & Swasey
Haiss Mfg. Co., Inc., Geo.
H. & L. Tooth Co.
Hammermills, Inc.
Harnischfeger Corporation
Hauck Manufacturing Co.
Heltzel Steel Form & Iron Co.
Hercules Motors Corporation
Herman Nelson
Highway Equipment Co., Inc.
Hose Accessories Company
Hough Co., The Frank G.
Huber Manufacturing Co., The

Jackson Vibrators, Inc.
Johnston and Jennings Co.
Joint Equipment Company, Inc.
Joy Manufacturing Company

Keystone Asphalt Products Company
Kiesler Co., Jos. E.

La Crosse Trailer Corporation
Leece-Neville Co., The
Le Roi Company
Lincoln Electric Company, The
Littleford Bros., Inc.
Lubriplate Division

Marlow Pumps
Master Vibrator Company
Michigan Power Shovel Company
Minneapolis-Moline

Naugatuck Chemical Division
Noble Company

Oliver Corporation, The
Omaha Standard
Onan, D. W. & Sons, Inc.
Osgood-General
Ottawa Steel Products, Inc.
Owen Bucket Co., The

Pacific Car and Foundry Company
Page Engineering Company
Philadelphia Textile Finishers, Inc.
Phoenix Products Co.
Pioneer Engineering Works
Pitman Manufacturing Company
Porter, Inc., H. K.

Republic Steel Corporation
Riddell Corp., W. A.
Rogers Brothers Corporation
St. Paul Hydraulic Hoist
Salem Tool Company, The
Sauerman Bros., Inc.
Schramm, Inc.
Service Supply Corporation
Servicised Products Corp.
Shunk Manufacturing Company
Standard Steel Corporation
Sterling Engineering & Mfg. Co.
Stow Manufacturing Company
Sumner Equipment Limited
Super-Compactors, Inc.
Symons Clamp & Manufacturing Co.
Syntron Company

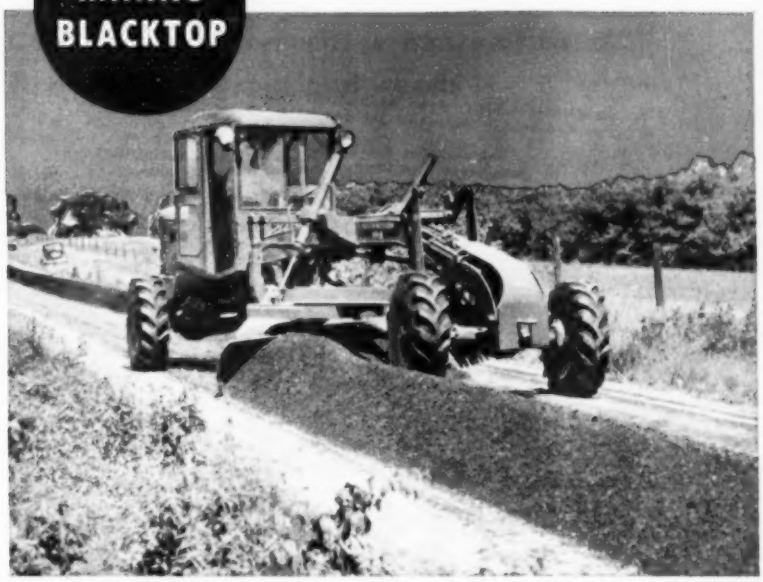
Talbert Construction Equip. Co.
Tarrant Mfg. Co.
Thurman Machine Co., The
Timken Roller Bearing Co., The
Titan Chain Saws, Inc.
Transport Trailers, Inc.
Tuthill Spring Company

Universal Engineering Corp.

Vibro-Plus Products, Inc.
Vulcan Tool Manufacturing Co.

Warner & Swasey Co.
Waterloo Foundry Co., Inc.
Waukesha Motor Company
Wellman Engineering Co., The
Whitestown Trencher Co., Inc.
Wico Electric Company
Williams Form Engineering Corp.
Winter-Weiss Co., The
Wyoming Valley Equipment Co., Inc.

Yaun Manufacturing Co., Inc.



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Austin-Western Power Graders do a superlative job on blacktop. ALL-WHEEL DRIVE provides the power and traction for high-speed operation. PRECISION SIDE SHIFT moves the blade in or out, as desired, while the grader is in motion. Ample throat room between top of blade and bottom of circle makes it possible to move a tremendous windrow without interference.

CONTROLLED TRACTION — product of exclusive ALL-WHEEL DRIVE and ALL-WHEEL STEER — places all wheels where they miss the windrow; moves a maximum amount of material the maximum distance. Yes, on oil mix, as on many other types of work, you've got to SWING THAT REAR-END for *top* performance.

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many other jobs

Austin-Western
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Road Rollers · Motor Sweepers

BALDWIN LIMA HAMILTON BLH
Construction Equipment Division

Manufactured by
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Subsidiary of Baldwin-Lima-Hamilton Corporation
AURORA, ILLINOIS, U.S.A.

Bought one DW21, reordered 6 more in 14 months!

DAVE GUSTAFSON & CO. INC.
HIGHWAY CONTRACTORS

502 EAST SIXTH — PHONE 9-3951 — SIOUX FALLS, S. D.

January 9, 1953

Caterpillar Tractor Co.
Peoria,
Illinois

Gentlemen:

Our experience in the contracting business dates back to 1926. Our original equipment consisted of one Caterpillar Model Sixty Tractor.

When Caterpillar came out with the DW10 rubber-tired Tractor, we bought two of these units with scrapers as we felt that moving dirt on rubber-tired rigs was a better way of getting the job done. Caterpillar didn't let us down!

In July of 1951 we bought our first DW21 Tractor-Scraper outfit. The performance of this machine was so good that we added two more units in February 1952. Since that time we have purchased four more DW21 Tractor-Scraper outfits; two in April and two more in September of 1952 for our road building projects in South Dakota, because we have found that this is the cheapest method known today for handling dirt on projects such as ours.

When we bought the two DW21 Tractor-Scraper units in September we had just started work on a sub-contract from Peter Kiewit Sons Co. for grade construction of the "four lane highway" from Weaver Airforce Base to Rapid City, South Dakota, consisting of 650,000 cubic yards to be moved in 90 calendar days. Hauls on this job ranged from 400 feet up to 2 1/4 miles one way. Working a single ten hour shift, six days a week our DW21s really put it across on time.

In addition to our DW21s, we have ten Caterpillar crawler Tractors, and five Caterpillar No. 12 Motor Graders.

Our DW21s have the power and stamina to stay on the job and keep the dirt "moving" without costly breakdowns and delays. We feel that Caterpillar performance is second to none and is backed up by the best parts and service facilities to be found.

Very truly yours,

DAVE GUSTAFSON & CO.

L. L. Malm

L. S. Malm
Vice President

Dave Gustafson & Co., Inc., of Sioux Falls, S. D., bought its first Caterpillar DW21 and Scraper in July, 1951. By September, 1952, it had a fleet of 7 of these earth-eating Cat* units.

Why?

L. S. Malm, vice president of the company, has a telling explanation:

"We have found this is the cheapest method known today for handling dirt on projects such as ours."

Don't keep throwing good money after bad on less capable earthmoving equipment. Have your Caterpillar Dealer demonstrate the money-saving advantages of having DW21s on your side.

Caterpillar Tractor Co., Peoria, Illinois.

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Roads and Streets in the News

Congressional committee hears of road financing program and needs

A high spot in the hearings on the nation's highway problem, held by the House roads committee in Washington in recent weeks, was the summary presented on May 12 by Michigan highway commissioner Charles M. Ziegler. These hearings began April 14 under Chairman J. Harry McGregor (R., Ohio).

Appearing as president of the American Association of State Highway Officials, Mr. Ziegler gave a detailed accounting of state highway department finances and expenditures in the past two years. At least $210,000,000 annually for federal-aid for the Interstate System was urged by Ziegler, as part of an enlarged federal road support.

"Finance may be said to be the 'beginning and the end' of the road problem," said Commissioner Ziegler, in stressing the urgency of the need facing roadbuilders. Among the facts and figures presented:

- The federal-aid primary system of 232,000 miles (7 per cent of our roads) carries 63 per cent of the rural traffic volume. The combined federal-aid system including primary, secondary and urban of 700,000 miles carries 83 per cent of all rural traffic on its rural portions.
- The 2,400,000 miles of local or land service roads and streets, collectively carry 17 per cent of all rural traffic. About 1,000,000 miles of these carry 10 vehicles or less per day, yet must be maintained.
- Twenty-five years ago road and street revenue came 80 per cent from general taxes and 20 per cent from user taxes. Today these figures are approximately reversed.

The "Deducts"

- While diversion of road funds has continued in some states, 24 states now forbid diversion by constitutional amendment.
- Of the $3,011,528,000 collected by the states in highway user tax proceeds in 1951, deductions required by law—such as for allocation to counties and cities, agricultural refunds, highway policing, diversion to non-road use, etc.—whittled the sum to $1,649,752,000.
- Adding federal-aid allotments, and other revenues, the states retained for state highway purposes in 1951 a total of $2,441,362,000. Again accounting for deductions, such as federal-aid spent on local roads, and for maintenance, administration, and bond retirement and interest, there remained only $1,455,624,000 for capital improvements on the nation's state roads.
- After outlining this serious circumstance, wherein only 38 per cent of federal and state road funds are left for new roads, Commissioner Ziegler reviewed the growing highway inadequacy. Over 64 per cent of the federal-aid system is sub-standard for safe, efficient transportation, he noted, and 72,000 sub-standard bridges help swell to $32 billions the total of deficiencies that must be corrected by a stepped up road building program.
- Ziegler's testimony went on to answer the series of questions asked by the committee on specific points relating to highway policy.

Previous witnesses appearing before the committee during April and May included Francis duPont, Commissioner of Public Roads; Sinclair Weeks, Secretary of Commerce; Robert B. Murray, Jr., Under Secretary of Commerce for Transportation; J. T. Sanders, National Grange; Matt Triggs, American Farm Bureau Federation; Angus MacDonald, National Farmers Union; Chelsie J. Senerchia, Mayor of Miami, Fla.; Glenn C. Richards, Superintendent of Public Works, Detroit; W. R. Kellog, City Manager, Cincinnati; Virgil Gunlock, Commissioner of Public Works, Chicago; George C. Hyland, Commissioner, Department of Public Works, Boston; and Raleigh W. Gamble, Director of Expressways, Milwaukee. Other witnesses were expected to appear during May.

The series of witnesses representing large cities and their stake in the federal-aid highway program gave an impressive picture of the urban traffic problems pressing for solution. Gunlock of Chicago told of the growing diversion of available state road user funds from cities, where a concentration of traffic demands a substantial share of the proceeds. While cities get back only a small part of the road monies, he said, they account for two-thirds of the country's population and over half the vehicle-miles of auto and truck traffic. The seriousness of the situation is accentuated by the great cost of expressway-type facilities needed to solve congestion. The 24 miles of expressways planned for Milwaukee, according to Mr. Gamble of that city, will cost $182 millions, to quote one example.

Subcommittee on contract maintenance is formed

Of considerable long-range importance to both contractors and highway departments is the recent formation of an AASHO subcommittee on Contract Maintenance. It was set up by R. H. Baldock, chairman of the Association's Committee on Maintenance and Equipment, with first duties to report a recommended program of activities at the Association's next annual meeting this Fall at Pittsburgh.

Committee membership thus far appointed includes C. W. McCaughey, Chief Engineer, Ohio Department of Highways (chairman); N. A. Staples, Chief Maintenance Engineer, Pennsylvania Department of Highways; V. L. Ostrander, Superintendent of Operations and Maintenance, New York State Department of Public Works; W. H. Harris, Maintenance

★ Conferring at Congressional Road Hearing: Hon. George H. Fallon (Dem., Md.) ranking minority member, House subcommittee on roads; Gen. Eugene Reybold, Executive Vice President, American Road Builders' Association; Hon. George A. Dondero (Rep., Mich.), Chairman, House Committee on Public Works; Francis V. duPont, Commissioner, Bureau of Public Roads; Hon. J. Harry McGregor (Rep., Ohio), Chairman, House subcommittee on roads. (Reni photos)

It's still a construction man's war

★ Korean prisoner exchange area being cleared by engineers in the First Marine Division. Heavy equipment such as shown expedited preparation of site for tents, hospitals and administrative area for handling sick and wounded prisoners. (United Press Photo)

Engineer, Virginia Department of Highways; C. W. Leftwich, Maintenance Engineer, Georgia State Highway Department; R. P. Newland, Maintenance Engineer, Washington Department of Highways; H. A. Radzikowski, Chief, Maintenance Branch, U. S. Bureau of Public Roads. Other names are likely to be added, including representation from southern states.

The new subcommittee stems from a long-time interest in maintenance matters by Mr. Baldock, who as a former maintenance engineer and for many years state highway engineer of Oregon has been a national leader in the advancement of highway maintenance practices. The immediate impetus for the subcommittee was a meeting of the ARBA-AASHO joint committee at Omaha late in 1951, when the problem was discussed of bringing about a closer relationship between contractors and state highway maintenance people.

Contractors are accustomed to working with state construction engineers, it was pointed out at that meeting, and in many states have had little opportunity to become acquainted with maintenance engineers and their requirements. While in some states, notably Minnesota and Ohio and a few others, a substantial volume of road repairs has been done by contract, most of the $1,600,000,000 expended annually on state highway maintenance is still spent by force account. "It is, of course, realized that routine maintenance work is essentially a state force operation but there are specialized fields in which the contract method is admirably suited," Baldock said. The highway departments, on one hand, might appreciate an opportunity to utilize contractor organizations to help level off peak or seasonal employment. The contractors, on the other, have expressed a willingness to take on certain types of repair and maintenance work for which they are organized and equipped. It is felt that the public will gain by a closer cooperation in this area of endeavor.

Contractors take part in Ohio staff conferences

The Ohio Department of Highways again this year held a series of construction staff conferences in the 12 division offices during February, March and April. A variant from past practice was the inclusion of contractor representatives in the afternoon sessions.

As reported by H. R. Craig, Chief Engineer, Bureau of Construction, "The morning session in each instance was held with the Division Engineer and our own personnel only in attendance. At this session means of speeding up our work and our decisions pertaining to the project were discussed. As a result of these discussions, policy has been formulated which will accomplish this purpose.

"The afternoon session was an open-forum type of meeting, with the State personnel, contractors and their representatives sitting in. Everyone was given an equal opportunity to participate. Contractors were very receptive to this opportunity and took full advantage to express their views and air their complaints. Project engineers, who operate directly with the contractor on the project, did likewise. By this method of approach it gave us, as policy maker and administrator, an opportunity to fully understand the problems of both the State and the contractor. Consequently, we are able to formulate policy which is workable and not arbitrary from the standpoint of one side only.

"This was the third year for these Conferences here in Ohio and many knotty problems of the past have been eliminated, with improvements resulting from year to year.

"Mr. Charles McKee, Executive Secretary of the Ohio Contractor's Association, represented the contractors, and my staff and myself represented the State at all Conferences. Director Linzell also participated.

"All problems arising from the Conferences were presented in a meeting between the Specification Committee of the Contractor's Association and the Chief Engineers of the Department (construction, maintenance, planning and programming, location and design, testing and research, and bridges), presided over by L. F. Schaeublin, Assistant Director & Chief Engineer. In this manner each Chief Engineer becomes familiar with the problems as they relate to his Bureau and can so organize his work to become more readily adaptable to construction. We believe this system gives far better relationship between the State and the contractor and results in better workmanship and cheaper prices for our Department."

Score Board for Turnpikes

In operation in	8 states
Under construction	3 states
Legislative authority	11 states
Under construction	11 states

844 miles in operation
793 miles under construction
692 miles authorized
2,425 miles to be ready in next two years
3,000 miles additional, legislative authority pending

• Fifth construction contract for the 33-mile leg of the Pennsylvania Turnpike around Philadelphia is awarded to James D. Morrissey, Inc., for $5,385,313.12 covering all work for a 7.6-mile section.

★ Francis V. duPont, Commissioner of the Bureau of Public Roads, who succeeded Thos. H. MacDonald.

Toll Roads: A New Form of Diversion

The word "diversion" is an ugly one to roadbuilders. It stands for the three billion dollars that has been taken from citizens as road user taxes but used for non-highway purposes by the states.

More recently, the term has been employed in reference to the federal gasoline tax and motor vehicle excise tax, only a minor part of which is returned to the road user as federal highway aid.

There is today another serious type of diversion, not of road funds but of public interest, legislative consideration and—more serious, perhaps—technical energy and manpower. That is the sidetracking of main highway problems in favor of toll turnpike proposals. Such proposals have been weighed in 24 states this year. In several states the controversy of toll roads has reached white heat—as in Oklahoma, for example—while the highway network which serves all the people continues to get no better fast.

Big Toll Road Year

This year promises to see upward of $500 million spent to initiate, continue or complete toll road construction in New York, Pennsylvania, New Jersey, West Virginia, Ohio and elsewhere. These largely worthy projects account chiefly for the spurt in the national road construction total in sight for 1953 which is likely to be up 25 or 30 per cent over 1952. These roads thus far authorized will in most cases fill an acute special need. But the real measure of our progress in catching up with traffic wear and tear is, how much is being spent this year on our state-wide road systems?

Despite the most active legislative year in history, in road matters, with 44 state legislatures convening, the new revenue sources voted for statewide highway work by these tax conscious bodies will not be enough in any state to enable highway departments to match road deterioration with road renewal or replacement.

It is recognized that we cannot hope for Utopia, and therefore should not expect to see highway deficiencies financed in one sudden decision, although states such as Massachusetts with its $400 million bond program, Maryland with its new program, and a few other states have shown real progress.

We should be thankful for the additional funds and better legal and administrative machinery voted this year in some states.

But these measures of progress must be weighed against the job yet to be done.

Highway department leaders have as their continuing responsibility the task of keeping themselves, the legislatures and the public realistically informed on highway network needs.

Force Account or Free Enterprise

Editorial in Ohio Public Works

Each session of the General Assembly is confronted with bills seeking to raise the dollar limits on materials and services for which no bids are required. Tied in with these proposals is the age-old goal of politicians to build up government payrolls by revising the statutes to allow more work to be done by government forces or day-labor or force-account methods. Surprisingly, an extra large number of bills on this type of legislation have been introduced in this session.

This Association views such trends with misgiving. It is not the contractors, but the public at large, who will suffer the consequences. Someone has aptly said that there are only three reasons for force-account work: (1) An emergency exists and there is not time to prepare plans; (2) The engineer is unable to estimate the quantities of work to be performed; (3) The owner is not sure of what he wants to do.

Of these three, the only valid reason is the first, the existence of an emergency.

The greatest safeguard for the expenditure of public funds is to have careful planning and plans worked out by competent engineers; advertise the proposed work in newspapers, so that the public is aware of what is proposed; have firm bids and the work speedily and efficiently prosecuted by competent contractors. This is the free enterprise way on which this country was built.

Briefly Noted

Accomplishing anything finally depends on people. That goes for roadbuilding, where the engineer shortage is our real post-war bottleneck. And it goes for opening and starting rolling in a new factory.

Thoughts along these lines were well stated recently by J. R. Steelman, President of Koehring, on the occasion of opening the firm's new plant at Chattanooga. In paying tribute to the people involved in bringing the plant into being, he said, "We get so involved in plans and schedules, deadlines and controls, machines and production, that we often lose track entirely of just what it is that creates these things and makes them work or turn out.

"All too often we are prone to ignore completely the fact that all of the tools and the papers we pore over are relatively unimportant factors compared to the combined and integrated, and sometimes opposing, human forces and efforts that are applied to even the smallest and simplest endeavors. The story of this new plant is one of many people working to a common end."

* * *

General Motors Corporation, our biggest business enterprise, continues with its policy of playing up the importance of roadbuilding. Its annual report for 1952, which is an impressive printed booklet, dramatizes road modernization with a striking oil painting reproduced in full color on the front and back covers. Entitled "Trail Blazers", this illustration by artist John Falter is to be reprinted and widely offered free to the general public.

In commenting on this painting the GM booklet states, "The job of keeping America on wheels, of providing mobility for goods and people, is essential to the fulfillment of our country's promise. But of what avail the wheels to meet the needs of our daily lives if the paths are crowded and the way remains beset with hazards?"

* * *

Traffic toll for 1952, figures "official" from National Safety Council:

Deaths	38,000—up 2%
Injuries	1,350,000—up 2%
Cost	$3,600,000,000—up 5%
Mileage	518,000,000,000—up 5%
Death rate	7.3—down 4%

Pedestrian deaths were down 4 per cent from 1951, but non-pedestrian deaths were up 4 per cent. Urban traffic deaths from all causes were 8 per cent less, reflecting more effective enforcement and educational programs, while rural traffic deaths were up 6 per cent (probably reflecting higher speeds as well as volumes).

★ "Moonshine holler" country—as confronted by the Nello L. Teer Co., one of the contractors on the West Virginia Turnpike. Clearing shown in progress February 15, 1953. Clearing has been a major task on this turnpike, much of it having to be done by hand due to inaccessibility to power equipment. Grading has attracted low bidders from nine states to date

★ Same scene a month later—dozer trails cut and drilling begun for blasting. Teer's 3.07-mile job entails moving 1,800,000 cu. yd. Equipment: three 2½-yd. shovels, 12 rear-dumps, 10 tractors, 4 dumptors, 2 motor graders, 3 heavy sheepsfoot units, 2 flat rollers, 1 dragline, 1 rotary drill, 1 heavy percussion drill, 6 wagon drills, 4 compressors (500's)

Big Grading Job Started for West Virginia Turnpike

Contractors reached 40,000 cu. yd. daily pace in May as remaining grading jobs were readied for letting. 175,000 cu. yd. daily pace expected by Autumn. Alternate bids to be taken for concrete and asphalt paving.

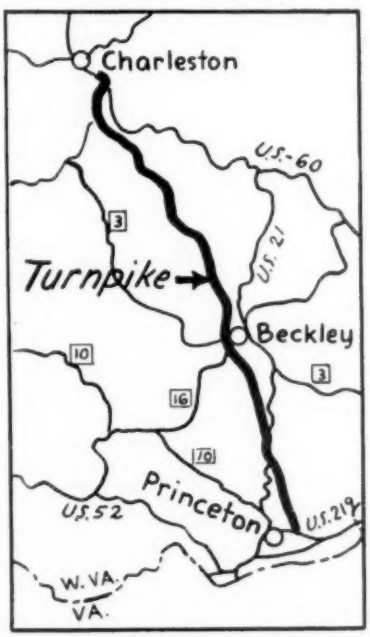
THE West Virginia Turnpike is now in the active grading stage, and its contractors should earn an estimated $30 million this year, as part of the $400 million or more in toll road construction scheduled over the Nation for 1953.

Lettings began early in the winter for the controversial project, which is now to be a 2-lane limited-access highway threading 88 miles through the mountains from Charleston south to Princeton, W. Va. The project, to cost $60 million for construction, is financed by revenue bonds underwritten by investment bankers after a proposed section north of Charleston was lopped off and the road reduced from four lanes to two. Completion is set for June 1, 1954.

This road differs from other toll projects built or planned over the country, in several noteworthy respects. It sets something of a record for heavy earthwork, despite being graded for only two lanes. Over 25,000,000 cu. yd. of unclassified excavation with a high proportion of rock will be required to build the road along the steep valley sides and through the mountainous southern West Virginia region. Cuts as deep as 150 ft. and fills up to 120 ft. (measured at road centerline) are required, and some contract sections will run 500,000 to 600,000 cu. yd. per mile.

Another feature is the heavy clearing required. About 1,100 acres of right of way is being cleared, much of it so steep the equipment cannot operate, with oaks and other hardwood predominating. Clearing was about 50% completed by May, although a few grading sections had not yet been awarded, and grading was just getting into "high" under a policy of awarding clearing, grading, drainage and bridge substructures together for each contract section.

A feature of the road design is the development of special standards for benched cuts, based on experience with West Virginia's serious and widespread slide problem. A special test for slacking of freshly exposed soils has been developed by the general consultants, as an aid in determining safe slope design. Four standard benching schemes are provided for deep cuts, depending on soil or rock type and differing chiefly in the height and slope angle up to the first bench. The grading, by the way, does not provide for future four-laning, except that excess or spoiled cut material may at times be wasted as additional



★ Omitted from this map is the important city of Bluefield, mining center, near the Southern terminus

embankment width where this is a convenient disposal method.

Soils data for determining roadway and structure design have been obtained from an extensive boring program, carried out by contractors specializing in this work. Electrical resistivity methods are being used in conjunction with other geological studies to determine slope stability and check foundation conditions.

"Creeper" Lanes a Feature

The turnpike main roadway will consist normally of two 12-ft. paved lanes and 9-ft. stabilized shoulders. Extensive truck laning on uphill grades of 3, 4 or 5 per cent, depending on length, will be a design feature greatly adding to the traffic capacity. Where a "creeper" lane is provided, the pavement will be 36 ft. wide, with a 2 ft. shoulder on the truck lane side. Lanes will be added on both sides where necessary due to proximity of summits.

The turnpike is designed for 60 m.p.h. maximum speed, with grades limited to 5 per cent or less and curves to a minimum of 1,000 ft. radius. The new highway will thus be in dramatic contrast with the existing tortuous, steep roads of the area which have severely limited the growth of truck traffic.

The right of way width is variable, 250 ft. being sought for much of the distance and up to 400 ft. required for some cuts and fills. The right of way agents, with their share of "human" problems, have had to move 700 houses, over a thousand graves, and several pumping oil wells. The population, although sparse, is found chiefly along the narrow valleys skirted by the pike.

The turnpike will have one 2,600-ft. ventilated tunnel, through a ridge a few miles south of Charleston. Of the 80 bridges and grade separations, three major stream crossings are being built under separate substructure contracts. Superstructure steel for all bridges has been awarded to two fabricators and field erection to one of these fabricators.

The turnpike is being built by the West Virginia Turnpike Commission, Ray Cavendish, executive director. The engineering firm of Howard, Needles, Tammen & Bergendoff, with E. K. Timby as managing partner, is serving as general consultant, having over-all charge of design coordination and construction supervision. This firm designed the major bridges. Gannett, Fleming, Corddry & Carpenter; Fay Spofard & Thorndike; and Capitol Engineering Co., respectively, are furnishing construction plans and supervision for three turnpike sections.

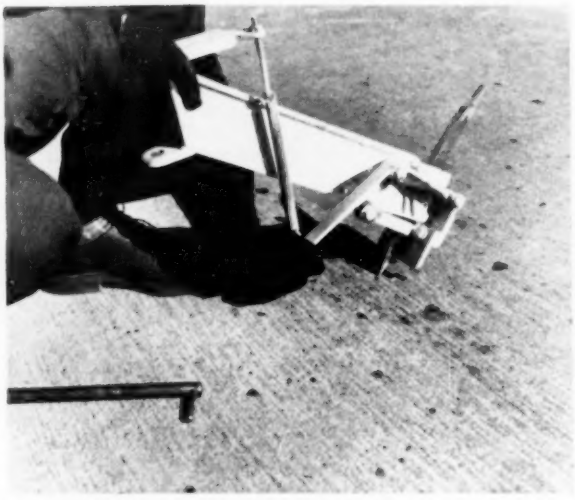
Many out-of-state contractors have been attracted to the West Virginia project, as shown by the accompanying tabulation of contracts awarded to May 10.

Contracts Awarded on West Virginia Turnpike

(As of May 10, 1953, with most of grading awarded, but paving and miscellaneous work not yet advertised)

No.	Description	Contractor	Contract Bid Price	Date of Award
1	Borings for Major Structures	Mott Core Drilling Company (1A, 1B, 1D)		
		Giles Drilling Co. (1C)	$ 32,839.00	6-11-52
2	Borings—Section 1	Cunningham Core Drilling & Grouting Co.	35,800.00	7-11-52
3	Borings—Section 2	Pennsylvania Drilling Co. (3A)		
		Mott Core Drilling Co. (3B)	94,260.00	7-22-52
4	Borings—Section 3	Cunningham Core Drilling & Grouting (4A)		
		Mott Core Drilling (4B)	73,085.00	7-25-52
5	Structural Steel Fabrication (numerous bridges)	Bethlehem Steel Co.	3,163,000.00	12-3-52
6	Structural Steel Fabrication (numerous bridges)	American Bridge Co.	3,987,000.00	12-2-52
7	Structural Steel Erection (all bridges)	American Bridge Co.	2,373,000.00	12-2-52
8	Grading, Drainage, Substructures, Sec. 1 (Mile 9.0 to 11.0)	C. E. Wetherall Co., Huntington, W. Va.	391,637.90	8-21-52
9	Grading, Drainage, Substructures, Sec. 2 (Mile 20 to 25)	Oman Construction Co., Inc., Nashville, Tenn.	1,258,603.10	1-9-53
10	Grading, Drainage, Substructures, Sec. 3 (Mile 68.3 to 71.3)	Nello L. Teer Co., Durham, N. C.	2,952,435.75	1-12-53
11	Substructure—Bluestone River Bridge	Lewis and Bowman, Inc., Goldsboro, N. C.	248,130.00	12-20-52
12	Substructure—Fourmile Fork Bridge	Bates and Rogers Const. Corp., Chicago, Ill.	257,999.00	1-6-53
13	Substructure—Kanawha River Bridge	Maxon Const. Co., Dayton, Ohio	560,430.00	2-26-53
14	Standard Tunnel Construction	Bates and Rogers Const. Corp., Chicago, Ill.	2,858,043.25	12-20-52
15	Standard Tunnel—Ventilating Fans, Motors, Transmission	American Blower Co., Detroit, Mich.	88,792.00	2-4-53
16	Standard Tunnel—Ventilating Building	Kuhn Const. Co., Charleston, W. Va.	700,838.75	5-7-53
17	Standard Tunnel—Electrical Equipment			
18	Grading, Drainage, Substructures, Sec. 1 (Mile 0.0 to 4.8)			
19	Grading, Drainage, Substructures, Sec. 1 (Mile 4.8 to 9.0)	W. E. Graham & Sons, Cleveland, N. C.	1,117,463.40	2-26-53
20	Grading, Drainage, Substructures, Sec. 1 (Mile 11.0 to 14.0)			
21	Grading, Drainage, Substructures, Sec. 1 (Mile 14.0 to 20.0)			
22	Substructures, 3 Rigid Frame R.C. Bridges			
23	Grading, Drainage, Substructures, Sec. 2 (Mile 25 to 36)	Central Penna. Quarry, Stripping & Const. Co., Hazleton, Pa. (23A)	2,309,767.10	2-26-53
		Latrobe Road Const., Inc., Latrobe, Penna. (23B)	1,732,693.50	3-26-53
24	Grading, Drainage, Substructures, Sec. 2 (Mile 36 to 50)	Latrobe Road Const., Inc. (24A)	1,377,145.55	4-24-53
		Clark-Farrell Co. & H. N. Rodgers & Sons Co., Memphis, Tenn. (24B)	2,070,132.75	4-30-53
		H. W. Holt & Son, Columbus, Ohio (24C)	2,395,075.00	4-30-53
25	Grading, Drainage, (Mile 50 to 56.4)	S. J. Groves & Sons, Minneapolis, Minn.	5,864,541.50	4-30-53
26	Grading, Drainage, (Mile 56.4 to 67.2)			
27	Grading, Drainage, Substructures, Sec. 3 Mile 71.3 to 80.3	Ralph E. Mills Co., Frankfort, Ky., and Morrison-Knudsen Co., Boise, Idaho	6,184,347.50	3-3-53
28	Grading (Mile 80.3 to 88)			

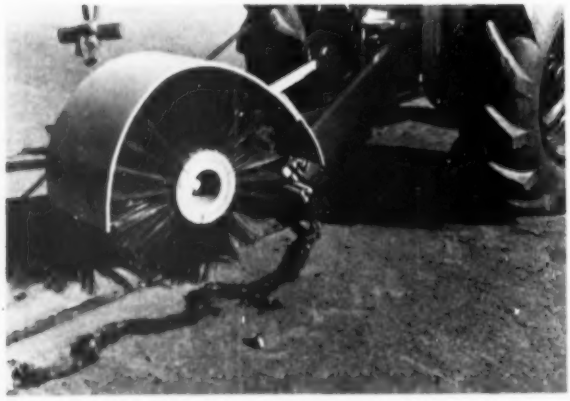
★ Rooter equipment developed by the Ohio state highway maintenance force



★ Detachable draw bar with tooth and scraper, also built special for the Ohio joint work

Ohio's New Cold Joint Seal Methods

★ Blowing out joint with air jet



★ Tooth scraper, and rotary brush cleaner

By C. W. McCaughey

Chief Engineer, Bureau of Maintenance & Repair
Ohio Department of Highways, Columbus

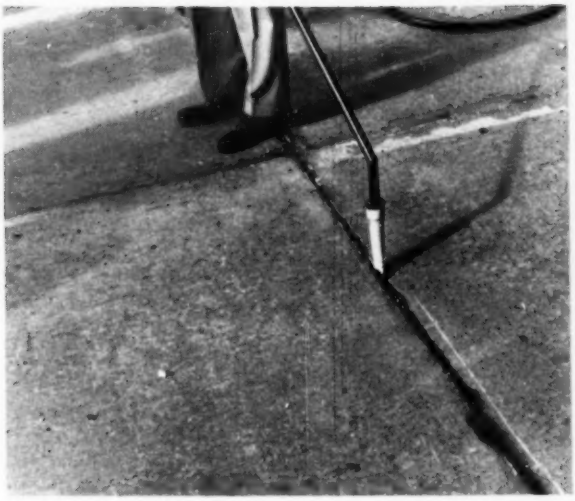
OVER a period of years our State has had considerable difficulty in accomplishing good joint sealing jobs. Various materials have been used, including different types of asphalt materials and hot poured joint sealers, rubber type. Hot poured joint sealer has been used on practically all new construction projects within recent years and our Maintenance forces have used all of the above materials at various locations. These materials have never proved entirely satisfactory, and we have continually searched for a longer lasting, more easily applied sealer for this purpose.

During the fall of 1951 our Department experimented with a small amount of cold applied ready mixed sealing material, rubber type. The cold seal material was applied by means of a pressure pump, hose, and nozzle in previously cleaned joints and covered with paper stripping.

Special Grooving Machine

On some joints the old filler was removed with a joint grooving machine. Others were cleaned out by hand methods. Grooving machine cutters generated enough heat to warm the old sealer to such an extent that it tended to stick to the pavement surface and in some instances to the side of the joint. It was readily apparent that the cleaning operation would require a different method and to that end our equipment personnel developed a rooter to facilitate this work.

The rooter is propelled with a small garden tractor, powered by a 4.2-hp. gasoline engine. A clutch and two-speed drive was utilized to get the necessary control and speed while using the machine and traveling from one joint to another, and a quick detachable draw bar was designed with a satisfactory tool for removing the old material.



★ Making cold sealer application

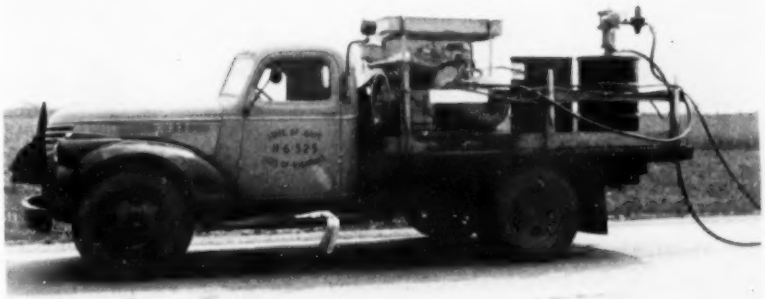
★ Covering joint with Kraft paper

Many joint assemblies used in Ohio have a metal parting strip which is installed ½-in. below the surface of the pavement, whereas older projects have an impressed groove one-third the depth of the slab; these groove widths were variable, and required a design which would permit use of a tool for the different widths and depths. It was also considered desirable to scrape the pavement surface on both sides of the joint to remove excess filler. This was accomplished by making the rooter tooth rigid and the scraper tooth flexible. A rotary brush approximately fifteen inches in diameter and six inches in width was placed on the machine to sweep out the joint and clean out the pavement surface on each side, and a counterweight was mounted on the front end for traction and support.

Good Results Apparent

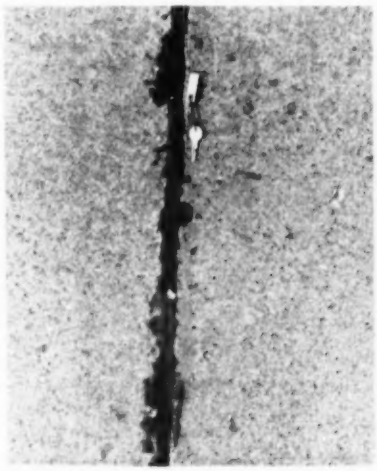
Work practices have been improved with increased use of this material. One division started this operation with a trailer and compressor, and recently mounted a compressor on a flat bed truck, which permits carrying all equipment and materials on one unit. This material can be used successfully at near freezing temperatures by using inside storage, and the advantages of increased production resulting from elimination of the heating process is extremely important.

Our experimental work in 1951 was very encouraging, and another project was set up and completed with the same material in February, 1952. Recent inspections of the 1951 and 1952 work substantiated preliminary observation that this material had good maintenance possibilities. On the basis of these experiments and spot work performed in three of the highway divisions, our Department is planning to use the cold poured material at several other locations throughout the State.



★ Truck unit with compressor, pump, and drummed material

Experimental work was performed in Division 6, with headquarters in Delaware, Ohio, under the supervision of H. D. Schoonover, Division Engineer, and F. C. Higley, Maintenance Engineer.



★ Close-up of concrete joint sealed in October, 1951, and which appears in good condition today

★ Close-up of bituminous concrete crack sealed in February, 1952. Crack grooved prior to sealing

★ With moisture fed from a water tank truck, Wood Roadmixer moves down one of the future Edwards Air Force Base streets and mixes native desert material with moisture and cement

Soil Cement Streets for Expanding Air Base

From first windrow to compacted, sealed base in three hours is the pace accomplished on this highly mechanized job by Clyde W. Wood & Sons.

ONE of the major items in the latest expansion of Edwards Air Force Base, near Mojave, California, was a street construction program totaling 49 miles. When engineers of the Los Angeles District office of the Corps of Engineers settled on a design for the big street program, they chose 6 inches of compacted soil-cement stabilization for a sub-base, topped by 2 inches of plant-mixed asphaltic concrete surfacing. The design was adopted for the entire layout, and all street widths were planned in multiples of 11 ft. for easy paving.

Fredericksen & Kasler, Los Angeles contractors, have the first 19-mile section of this street system under way, and the stabilization work is moving ahead at a rate of 2,000 ft. per 8-hour shift. Clyde W. Wood & Sons of North Hollywood are subbing the soil-cement work from the Fredericksen & Kasler prime firm, and have set this phase up on a tight, well-planned schedule. Streets in the Clyde Wood job are 22 and 33 ft. wide.

Steps in the Job

In chronological order, construction steps follow this general pattern:

Grading: All grading is being done by the prime contractor, along with necessary concrete curb construction where curbs are specified. The new section of the air research center sets in a relatively flat desert just above the huge dry lake-bed now forming the principal part of the base. Because of this favorable terrain, it was possible to lay the entire new portion out on paper before a shovelful of dirt was turned. Moreover, all street grading was so easy that it could be done largely by motor graders. The native granular desert material is being shaped by these machines, after which it is sheepsfoot rolled to a density of 95 per cent (modified AASHO method). The street grade is being built high enough so that the addition of cement in the upper 6 in. will bring the grade out as specified when later construction steps are taken.

Stabilization Preparation: Preparation for soil-cement stabilization follows a general plan for 500-ft. construction sections adopted by the contractors and approved by the Corps of Engineers. Fredericksen & Kasler are taking care also of this pre-stabilization phase.

Using the scarifier teeth of motor graders, the desert material forming the grade is loosened to a depth of 5 in. in one pass, and gently raked for the additional inch by a second pass of the machines. A Wood sizer, pulled by a crawler tractor, then shapes the material into windrows containing approximately 8 cu. ft. per lin. ft. On a 22-ft. street, for example, three such windrows are built.

Variable Cement Factor

Cement Injection: Corps of Engineers specifications give a latitude of from 5 to 9 per cent of cement by weight for the stabilization treatment. Soils cover a range from clay, sand, and caliche on down to decomposed granite, so laboratory studies on the various soil types have indicated so far cement factors of 6, 6½, 7 and 8 per cent. Bulk cement is being brought in to Edwards Air Force Base siding points by railroad cars from Tehachapi, Calif. The material is unloaded to a Wood bulk cement carrier through a small secondary storage silo.

Cement is spread across the top of each windrow according to percentages established just ahead of that operation by laboratory technicians. The truck which hauls this bulk material has a metering device, calibrated in percentages by weight, which spreads just the right amount of cement. By working short 500-ft. sections at one time, and by spreading cement generally during the morning hours before heavy windstorms hit the site, practically all the cement is saved for use in the mix. In no case is cement spread in more than one con-

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5 year Experience

with HUBER three-wheel roller leads Charlotte, N. C. to buy another HUBER

HUBER Three-Wheel Rollers are their own best salesmen — a big percentage of owners have come back for their second, third and fourth HUBER machines.

Charlotte, N. C., municipal officials bought their second HUBER on the basis of 5-year experience with their first one.

R. A. Robinson and O. B. Torrence, old hands at the operation of heavy equipment, find HUBER 10-Ton Three-Wheel ideal for their municipal needs. They praise its powerful and economical diesel engine, its year-after-year dependability and its ease of handling.

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struction strip at a time.

Mixing: Each windrow of soil and cement is being mixed out with from 8½ to 11 per cent of moisture by a Model 54 Wood Roadmixer, pulled by a Caterpillar D8 equipped with a special low range of gears to permit ground speeds of 17½ fpm. during the mixing process. Water for the mixing process came from the main Edwards Air Force Base supply hydrants, and was hauled by Oshkosh, White and International trucks of 4,400, 2,500 and 2,500-gal. capacity, respectively. Water is being transferred to the Roadmixer through a flexible hose connection, pumped and metered into the mixing mill by equipment on the roadmixer machine.

As the roadmixer moves down the windrow at a speed of about 17½ fpm., it picks up the material, passes it back through its pugmill, and mixes it intimately with moisture with the aid of heavy paddles driven from a single driveshaft operated from the D8 tractor's power unit ahead. The finished material turned out behind the machine is a homogenous, damp mass, ready for laying down.

Speedy Processing

Processing and Compaction: Processing and compaction steps are noteworthy chiefly because of a short 3-hour time interval which is maintained between the time the material is first picked up by the roadmixer until it is sealed after compaction. The mixed material is knocked down immediately behind the mixer, and spread to grade stakes which stay up close to the operation at all times. A 3-wheel 10-ton steel roller then places the initial compaction in the material, having very little difficulty getting the required 90 per cent compaction so long as the short time interval is respected.

Any moisture evaporating out of the soil cement is replaced frequently during this process by fog coats, applied by a small 1,100-gal. water tank truck. When initial compaction has been delivered, surveyors set the final bluetops, a finish pass is cut by a motor grader, and the final surface compaction is placed with the help of light pneumatic rollers pulled by an International rubber tire tractor.

As soon as final compaction and grade have been established, the construction section is sealed off by an application of .25 gal. per sq. yd. of EA-4 asphalt emulsion, supplied by American Bitumuls & Asphalt Co., of Torrance, Calif. This sealcoat permits the cement stabilized soil to cure out and develop optimum strength, and later on will serve as a bond when the plant mixed surfacing is put down.

Stabilizing Curb Strips

Some interesting soil-cement stabilization also will be done in the near future when a small Model 42 Wood Roadmixer moves in to stabilize 10 and 15-ft. strips just behind the concrete curb sections. This stabilization will serve for sidewalks, unloading areas, and so on.

The entire street development program at Edwards is noteworthy because it is one of the first times when a major base expansion could be planned carefully from the start.

★ One of the first construction steps in the stabilization work was the application of bulk cement by truck. A metering device was mounted on the back of the machine to deliver the proper amount of cement into the mixture

World's Biggest Runway?

Edwards Air Force Base, now under construction for the U.S. Air Force Research and Development Command, will have what is purported to be the longest runway in the world. The new runway will be 15,000 feet long, 300 feet wide, and 16 to 18 inches thick. It is being constructed by a combine of Ford J. Twaits Company, Morrison-Knudsen Company, Inc., and R. A. Westbrook, under a $6,500,000 contract with the Los Angeles District Corps of Engineers. The runway is to be of concrete with no breaks in the grade, and the transverse grade for drainage purposes is limited to .5%.

Preparation of the base course calls for 2,000,000 cubic yards of earthwork, and the concrete quantities in the contract amount to 391,000 cubic yards. Heat resistant concrete will be used for a considerable distance at each end of the landing strip.

Edwards Air Force Base is to be used for testing experimental aircraft by all branches of the armed forces and manufacturers developing planes for the Defense Department's use.

★ Grade men check the trueness of the compacted stabilized material as road mixing and rolling continue

JOB and EQUIPMENT IDEAS

Handy machine on street paving work

When it comes to handling a piece of paving work, standard methods can sometimes be dispensed with and everyone is ahead. This was the case recently on a job by Schloss Paving Company, of Cleveland, Ohio. The job was a re-paving project. For this center strip reconstruction the contractor elected to use a Gradall machine as an all-around pinch-hitting unit.

Its first work was to rip out temporary asphalt from the 4,900-ft.-long section, then grade for the concrete base. Next, with a 16-ft. wood beam attached to the scraper blade, the machine furnished power to strike off and finish the 8-in. concrete. Notched overhangs at the beam ends established the 2½-in. depth clearance for the hot mix asphaltic course to follow.

The method, devised by superintendent E. C. Behrend, was said to have permitted completion with less hand labor, which was in scarce supply, and with a minimum of traffic interference.

How to dig a trench three inches wide

The contraption pictured here was used successfully at Pinecastle Airbase recently and elsewhere, to trench for laying electrical and telephone cable and ducts. The contractor who devised the rig is R. J. Hine, of West Palm Beach, Florida.

The trench cutter is reported to have worked very well on this Florida job despite the sandy nature of the soil, although the workers sometimes had to follow instantly with the laying operation.

The trencher consists of a circular steel disc with cutting teeth mounted as shown, these teeth being demountable. The wheel is suspended at any desired position off the ground or in cutting position by means of a cable operated from the cab via a winch and power take-off. The cutter is turned by shaft connection through a second truck axle mounted in position immediately over the axle of the regular axle, with power coming from the truck engine.

★ Trencher cuts only 3 in. wide for conduit trench

★ A new way to strike off concrete for pavement base

Byron W. Matteson has retired from the post of Division Engineer, U. S. Bureau of Public Roads, Denver. He served the Bureau over 33 years, having been division chief since 1938.

His career was recently climaxed by the presentation to him of a Gold Medal Award for outstanding work in highway development. Commerce Secretary Charles Sawyer made the citation for "efficient administration, maintenance of excellent working relationship with the state officials, promotion of the Denver Valley highway, development of highway planning in the Western states, and effective adaptation of planning data to highway improvement programs."

• In Illinois last year 224 truckers were arrested ten or more times for violations of the statutory weight limitations. Under the 1951 act governing trucking on state highways, the state attorney general must direct the cancellation of licenses for truckers convicted 10 or more times. Several suits are pending in this matter.

★ Picture 1

★ Picture 2

★ Picture 3

★ Picture 4

New Power Equipment Ideas for

Presenting examples of mechanical units recently developed by manufacturers or devised by highway departments for roadside work. This is the first of a new series of summaries stemming from Mr. Garmhausen's work in Ohio and his activities as chairman of the Highway Research Board Subcommittee on Mechanization of Roadside Operations. (See also April and May 1951 issues of Roads and Streets for similar ideas).

By Wilbur J. Garmhausen

Chief Landscape Architect
Ohio Department of Highways, Columbus

M. E. Tiller (Pictures 1, 2)

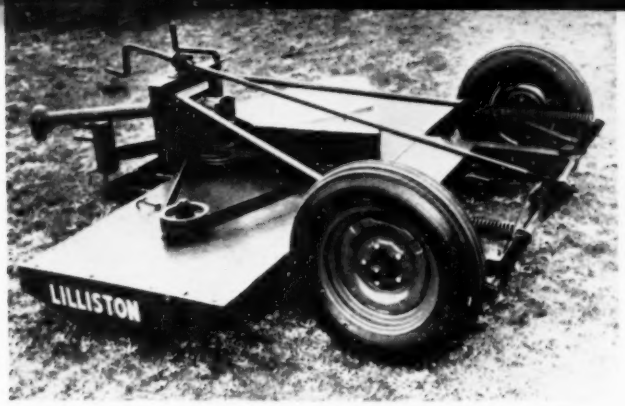
With this tiller an area 26 in. wide can be prepared to a depth of 1 to 8 in. It is self-propelled, and is mounted on dual declutching wheels with 4" x 8" rubber tires. All controls are on the handle bars, adjustable vertically and horizontally. It is powered by a 7½-hp. Wisconsin or a 10-hp. Onan, 4 cycle, air cooled engine; V-belt cushioned drive. The transmission has two forward speeds, positive rotor clutch.

Tines 12-in. long of alloy heat-treated steel, circle an alloy shaft fitted with Timken bearings. The unit rotates under a protective steel hood, part of which can be raised and lowered.

Manufacturer: Milwaukee Equipment Mfg. Co., South Milwaukee, Wis.

★ Picture 5

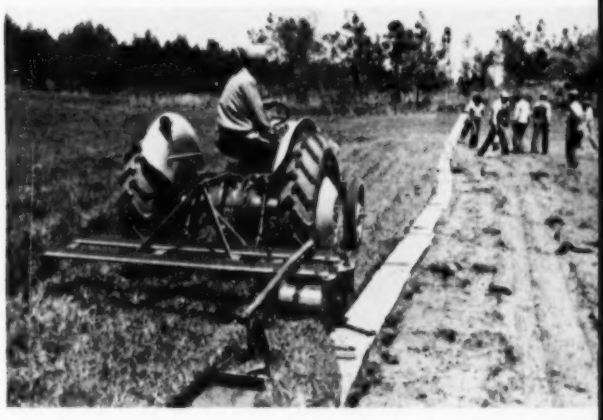
★ Picture 6



★ Picture 7

★ Picture 8

★ Picture 9



★ Picture 10

Roadside Landscaping and Maintenance

Scythette (Pictures 3, 4)

In one hour the 24-lb. Scythette can do the work ordinarily requiring four hours by hand, running four full hours per gallon of fuel. It trims perfectly and evenly as you walk. It can be carried anywhere with ease.

The double-action ground steel cutting head, 20 in. wide, is powered by a $1\frac{1}{4}$-hp. single cylinder, 2 cycle, 2 port type, air cooled motor. The transmission has helical gears mounted in Torrington needle bearings. The gear case is cast aluminum equipped with Chrysler Amplex powered bronze self-lubricating bearings.

The drive shaft is steel torque tube housed in aluminum tubing supported by bronze self-lubricating bearings. The shoulder strap is made of $1\frac{1}{2}$-in. heavy duty adjustable web belting.

Manufacturer: Scythette-Hoffco, Inc., Richmond, Indiana.

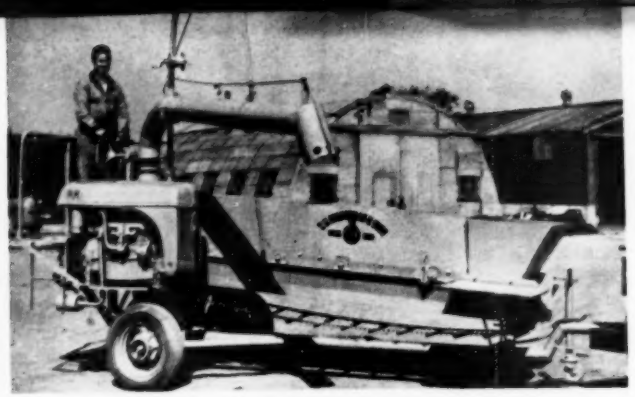
Sickle Bar Mower (Pictures 5, 6)

This mower has an attachment which assists in holding it on the slope—a 4 ft. long steel frame which attaches to a vertical pivot shaft on the top of the power scythe. A bicycle wheel is fastened on the opposite end of the frame. A stabilizing bar is attached to the front of the scythe by a swivel joint and hooks to the outer end of the frame. By unhooking the stabilizer bar the entire attachment

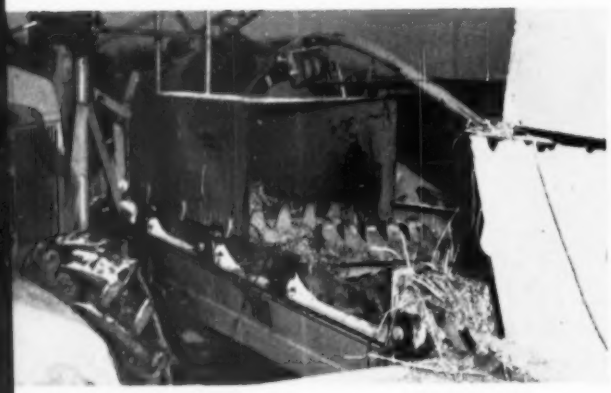
★ Picture 11

★ Picture 12

★ Picture 13



★ Picture 14



★ Picture 15

★ Picture 16

swings around on the vertical pivot pin to the opposite side of the unit.

Manufacturer: Sickle Bar Mower, Division of Reservoir Properties, Tennessee Valley Authority, Paris, Tenn

Roto Cutter (Picture 7)

The Roto Cutter, weight 1040 lb., can be attached and operated by any of the standard tractors with a power take-off. Ford Ferguson tractor, when used, requires a 1⅛ in. universal; other tractors, 1⅜ in. universal. Blood Bros. shielded universal connection is used. A hand-operated jack raises the machine for one-man hitching.

Operates at speeds up to 10 mph. Whirling blades cut a clean, wide 7½ ft. swath, with adjustable cutting height up to 16 in. Individual shear pins for each of the six blades protect them when hitting stumps or other large objects. The blades require no sharpening. Three rotary cutting bars, each having two blades attached, produce a fine chopped or shredded mulch of the existing growth. A hand crank adjusts belt tension for all blades simultaneously.

The suction-type blades are standard equipment. Heavy duty, high carbon, heat treated brush cutter blades are also available. Five drive belts, all of the same length, absorb the shock and give steady power.

A protective steel cover extends over all pulleys and belts. Wing skids protect the blades by preventing "digging in" on uneven ground. Timken bearings, enclosed in case hardened steel Alemite fittings, are used throughout.

Manufacturer: Lilliston Implement Co., Albany, Georgia.

Tractor (Picture 8)

This piece of equipment is engineered and built for mobility and compactness, for swift maneuvering and extra stability to work safely on hillsides. The tread width range is 60 in. and 68 in.

Manufacturer: The Oliver Corporation, 400 W. Madison St., Chicago, Ill.

Sod Cutter (Pictures 9, 10)

Attached to the power take-off of a tractor, this unit cuts the sod a designated width and the cutterbar undercuts the sod to a specified thickness. As the sod is cut it is lifted and moved into a compartment which directs it off to one side and on to boards. These boards, 12 in. wide and 8 ft. long, are previously placed along the sod which is to be cut. As soon as the sod is placed on the board, sod and board are ready for loading and delivery.

Manufacturer: S. T. Wall, Route 4, Box 190, West Monroe, Louisiana.

Tamping Roller (Pictures 11, 12)

Used to roll straw into the ground, this unit is a double drum with the studs on 8-in. centers. The studs are 6 in. high by 6 in. wide at the base, of ⅞ in. stock, shaped as pictured to prevent withdrawing of straw while being rolled into the ground. Weighs 1850 lb. empty and about 3850 lb. loaded; available with four drums instead of two, for covering a 10 ft. wide pass on flatter grades.

Made by the California Division of Highways, Sacramento. Not available commercially.

Straw Blower (Pictures 13, 14, 15)

This blower, like other units of similar purpose, is towed behind a truck. A section of a bale of straw is started through the end of the blower next to the truck. An endless chain carries the straw into the blower compartment. Enroute it passes over a cylinder which has four rows of wedge-like tapered steel fingers, 5 fingers per row. Alternate cylinders revolve in the opposite direction, fluffing the straw as it moves through the compartment. Drums are encased in a steel hood which can be readily raised and lowered. A Fordson tractor motor provides sufficient power.

Made by V. N. Holderman & Sons, Inc., contractors, Columbus, Ohio. Not available commercially.

Tree Mover (Picture 16)

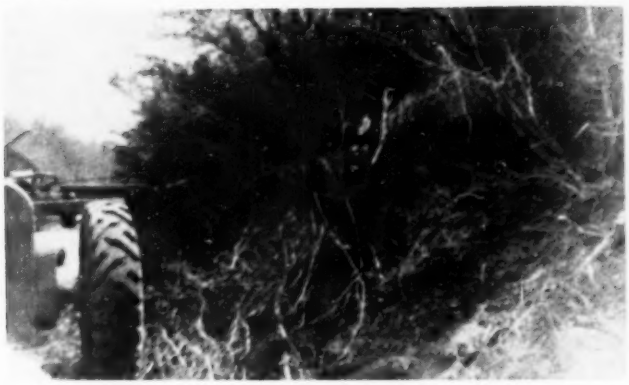
This piece of equipment, consisting of all-steel welded frame; welded steel cradle and boom assembly operated by push-pull ratchet jack; swivel front wheel assembly that swings up out of the way, with 15 x 7.60 tire and tube. Tire tread adjustable from 52 in. to 64 in. The machine is 12 ft. long, 7½ ft. high, weighs 800 lb., has a carrying capacity of 3000 lb. and/or a 52 in. diameter tree ball 30 in. deep.

The ratchet lever jack positions the boom 30 degrees forward or 30 degrees backward.

The six sloping sides support the tree ball at more than one point of

★ Picture 17

★ Picture 18



★ Picture 19

★ Picture 20

contact which prevents breaking up of ball. The tree ball sling, made of rubber covered belting with rust resistant metal parts is easily installed or removed and is adjustable for free ball size. The ratchet lever chain is supplied with a special 7-ft. load chain.

Manufacturer: Herman F. Beseler, 253 Plymouth Bldg., Minneapolis, Minn.

Stone Rake (Picture 17)

Towed by truck or tractor; height adjustable by a hydraulic lift, hand operated. Frame made of channel iron; tines of spring steel bolted between two pieces of steel which hold them in place. The angle of the rake is adjustable by rotating the front of the frame and tongue. Coil springs allow for the release of pressure exerted on the surface when an obstruction is encountered.

Made by Ohio Department of Highways, Columbus. Not available commercially.

Brush Mower (Pictures 18, 19, 20)

This unit is a heavy-duty brush mower developed by the U. S. Department of Agriculture Forest Service. It is mounted on a grader chassis and the power to operate the mower is obtained from the grader motor.

Made by U. S. Forest Service, Sacramento, Calif. Not available commercially.

Spreader (Picture 21)

This machine may be used to spread saw-dust and Baker Bark, which is a mixture of chipped slab bark mixed with saw-dust, for mulching purposes. It is a two-wheel tractor spreader, one-piece hitch and frame. All controls are within easy reach of the tractor driver. The short coupled hitch is extra strong and well braced. It permits shorter turns and easier handling. An upright rod controlling the king pin makes the hinged hitch easy to guide directly over the tractor drawbar. The self-locking stand couples easily and quickly to tractor draw bars of various heights. An endless chain, working off of a slowly revolving sprocket wheel delivers the load contents to the rear of the spreader. A 4-bar top cylinder controls the flow of material to the main cylinder which has 8 bars.

The teeth on the cylinders are round, high carbon steel. The hammer mill revolves at a high speed and evenly distributes the material over a full seven foot width. The drive sprocket is keyed to the main axle. Large roller bearings are used. Wheels are demountable type fitted with high cleat tractor tires.

Manufacturer: The Oliver Corporation, 400 W. Madison St., Chicago, Ill.

★ Picture 21

Air Plants Need Proper Auxiliaries

While the compressor is the prime unit in any compressed air plant, there are certain auxiliaries which are vitally important if the plant is to produce over-all maximum results.

EACH particular job will have specific needs which will determine to what degree auxiliaries should be used. A simple air plant utilizing auxiliaries is shown in Fig. 1.

Air Receivers

Two chief purposes are served by air receivers: (1) provide reserve air capacity; and (2) dampen pulsations or pressure waves originating at the compressor.

Because most compressors furnish air for intermittent use, there will be periods of peak air demand when all tools need air simultaneously. Without a receiver to hold air in storage, air pressure throughout the system would fall off. Considering rock drills as a distinct class of air tool, this drop in pressure can be serious, because a drop in pressure from 90 psig to 70 psig will cut drilling speed down about 41 per cent. Air stored in a receiver to meet instantaneous demands reduces this possibility.

Air going to tools directly from the compressor is in the form of pressure waves. Governing instruments particularly require uniform pressure free of pulsations. The space within an air receiver serves to dampen these pulsations before the air is delivered to the tools or instruments.

Size of a receiver is important. It must, of course, be large enough to perform its prescribed functions. If a receiver is too small, pressure variation in the system will be excessive and peak air demands cannot be met.

Standards on sizes and capacities for discharge pressures to 125 psig are tabulated below. A.S.M.E. code also governs construction. Only receivers meeting these codes should be used.

All receivers up to 42 in. x 10 ft. inclusive have screw openings; 48 in. x 12 ft. and larger have flanged inlet and discharge openings. Vertical receivers must have a base to raise them 6 inches above floor to permit hammer test by inspector.

Receivers are furnished complete with safety valves, pressure gauge, hand holes or manhole as required by Code, drain valve and nipple, and base for vertical receivers.

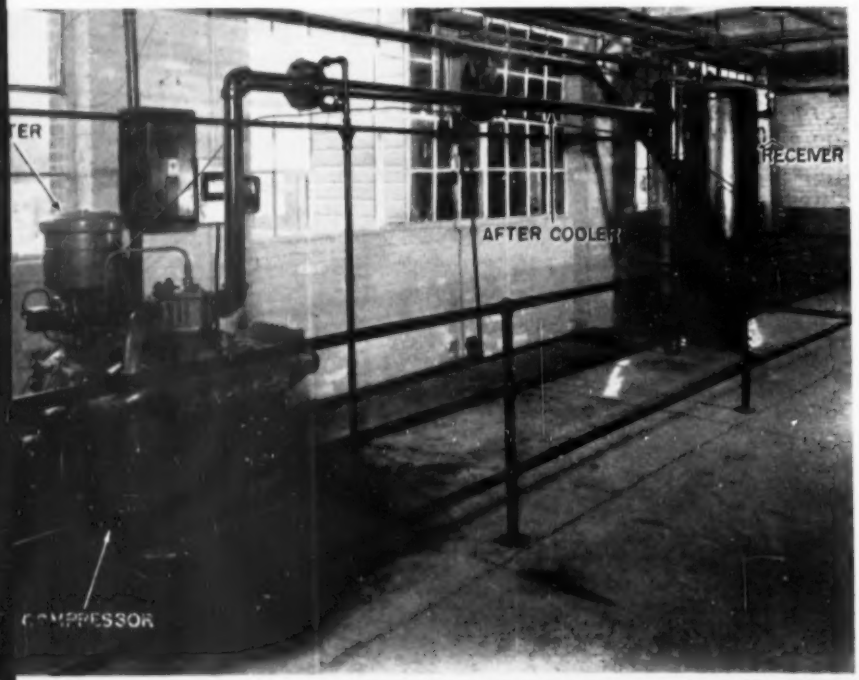
Aftercoolers

Air receivers also act to condense some of the moisture in the air which may pass the aftercoolers.

Water removal through condensation is the job of an aftercooler.

Photos and Data Courtesy Compressed Air and Gas Institute, Cleveland, Ohio.

★ Fig. 1—Small two-stage air-cooled compressor complete with dryer, filter, pipeline aftercooler, separator trap, and receiver



Presence of water in an air system may lead to trouble. In pneumatic tools, water not removed washes away the lubricant, resulting in rapid wear, excessive air consumption and high maintenance costs. Frequently water will freeze at the exhaust of tools, causing them to be sluggish and greatly retarding production. In concrete or paint sprays, water or oil is obviously objectionable. Water in compressed air lines causes "hammering," reduces capacity of lines, and, if it freezes, may burst the pipe.

Actually, there is a great deal of water in air (Fig. 2.). For example, 1000 cu. ft. of free air at 70 deg. F. and 100 per cent relative humidity contains about 1.12 lb. of water vapor. If this air is compressed to 100 psig and then later cooled to its original temperature, it will contain saturated water vapor weighing only 0.15 lb., which means that almost one pound of water has precipitated out. In an 8-hour day a 600 cfm compressor at rated capacity, handling free air at 64 per cent relative humidity, passes more than 150 lb. of water vapor.

Effectiveness of an aftercooler in preventing water from reaching the main air line is seen by following through the water data in Fig. 3.

By precipitating water and oil vapor, aftercoolers not only prevent equipment damage, but also save the air and time required by an operator for blowing out lines prior to using air equipment.

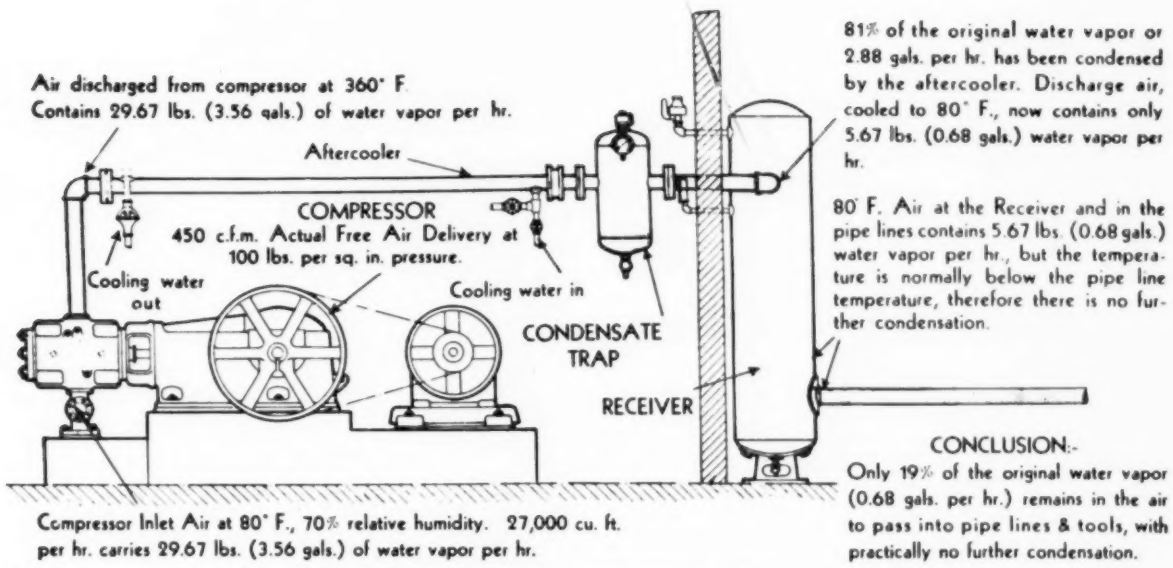
Installation of an aftercooler is made, preferably, between the compressor and the receiver so that any condensed moisture carried by the air leaving the cooler can be collected in the traps or receiver.

Aftercoolers consist essentially of steel shells or pipe containing a nest of tubes. Water circulates through the tubes; air passes around the tubes. Satisfactory performance requires the coldest water available. Aftercoolers should be of liberal size to insure maximum cooling of air and, consequently, maximum vapor condensation.

A standard of aftercooler perfomance adopted by U. S. manufacturers calls for a temperature difference of 15 deg. F. between the temperature of cooling water entering the aftercooler and air leaving the aftercooler, with about 1 gal. of water required per 100 cu. ft. of free air handled.

Separators, Strainers, Traps

These devices are inserted directly in the line between the aftercooler and the receiver and also along the distribution system. Their job is to take care of moisture which may escape through the aftercooler. Air leaving an aftercooler is still moist



★ Fig. 3—Compressor installation with data showing effectiveness of moisture removing auxiliaries

and should further cooling take place along the air system, additional water will precipitate out.

The amount of water that can be tolerated determines which of the devices should be installed. If spraying, for example, is one of the chief operations to be done from the centralized system, water must be reduced to an absolute minimum and the line leading to the spray should have separators or strainers. Air-operated control devices also demand water elimination.

Separators serve to remove heavy liquid particles; strainers, depending on internal design, take care of small particles of suspended moisture and oil. Designs of strainers and separators vary, and discussions with a compressor manufacturer can help determine which are best suited to a particular installation.

Moisture traps are nothing more than automatic valves placed at the separators or drain pockets to catch condensed moisture as it falls from the separator and provide a means for discharging the moisture.

Air Intake Filters

Just as there is a lot of water in air, there is also plenty of dirt. The figure of many construction areas is 4 grains of dirt per 1000 cu. ft. of free air. In this type of atmosphere, approximately 9000 grains of dirt, or more than 1.5 lb., would be carried into a 600 cfm compressor operating at full capacity 10 hours a day, within a 6-day week.

Dirt is abrasive, and if allowed to get into the compressor cylinder, will wear out parts, reduce efficiency, jump maintenance costs and multiply outage time. In one case, for example, a compressor without a filter required valve cleaning every two weeks. After the filter was installed, all that was required was to wipe the valves off once every six months.

Further evidence of air filter importance is borne out by the data of a tool on two identical gasoline engines, operated for 240 hours, one with a filter and the other without. The unprotected engine showned nine time the wear on cylinders, four times the wear on pistons, and ten times the wear on piston rings. Carbon deposits in the unprotected engine were five times heavier than in the protected engine.

Use of filters on the intake can also be classed as an element of safety. The elimination of dirt removes one hazard that might produce a spark to a combustible mixture formed in the discharge line, as mentioned earlier under aftercoolers.

Commercial intake filters, standardized and relatively inexpensive, leave no justification, today, for making a "homemade" filter of questionable efficiency. There are many types of wet and dry filters suited to particular service conditions. The compressor manufacturer is in the best position to recommend type and size. Generally speaking, the filter should be of ample size so as not to restrict air flow. If possible, a suction filter should not cause a pressure drop of more than two inches of water in the suction line.

Silencers

Where it may be desirable to reduce the noise usually made by the suction of the compressor, a silencer can be used. Several standard makes are available and recommendations can be obtained from the compressor manufacturer.

As with the filter, silencers should cause pressure drops not exceeding two inches of water.

Occasionally, noise referred to as "tank ring" is caused by discharge pulsations impinging against the air receiver. Discharge silencers are available to eliminate this noise.

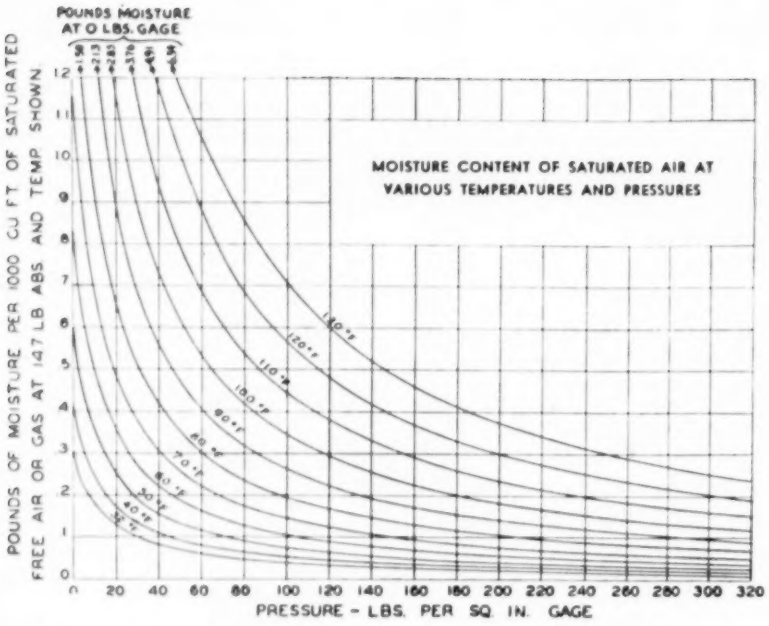
Protective Devices

Protective devices can be installed in every compressed air system to: (1) guarantee safe performance at maximum efficiency; (2) detect op-

A.S.M.E. Standard Air Receivers

Diameter Inches	Length Feet	Actual *Compressor Capacity for which Receiver is Suited Cu. Ft. Free Air per Minute	Volume Cu. Ft.	Safety Valves Number	Safety Valves Diameter Inches
14	4	45	4½	1	¾
18	6	110	11	1	1
24	6	190	19	1	1½
30	7	340	34	1	2
36	8	570	57	1	2½
42	10	960	96	1	3
48	12	2115	151	2	3
54	14	3120	223	3	3
60	16	4300	314	3	3
66	18	6000	428	3	3

*For automatic start-and-stop service, next larger size receiver is recommended to avoid starting too frequently.



★ Fig. 2—Weight of moisture per thousand cubic feet of saturated air at various pressures and temperatures

erating deficiencies so that correction can be made without major shutdown.

These protective devices include such as: safety and relief valves; oil filters; oil-pressure shutdown; overspeed shutdown; drains; and jacket water failure shutdown.

Safety and Relief Valves. If a shut-off valve is installed in the discharge line, a relief valve should be placed on the compressor side of the valve to protect the machine in case the operator starts the unit before opening the valve.

Oil Filters. Most of the larger compressors use force-feed lubrication for the running gear, in which all frame bearings are lubricated under pressure through drilled oil channels. Passing the oil through an approved filter keeps dirt out of the bearings.

Oil-Pressure Shutdown. Compressors with a force-feed system are frequently provided with an oil shutdown or oil alarm system. In the first case, if oil pressure goes down, the unit shut down and injury to moving parts is prevented. In cases where shutdown is not desirable, a device can be installed which will set off an alarm when oil pressure goes down, and the operator can correct the difficulty.

Overspeed Shutdown. In many cases, especially on the large steam and gas engine driven compressor equipment, an overspeed shutdown is desirable; such machines usually have limiting speed governors as standard equipment, where purpose is to limit the maximum speed of the machines. However, in case these governors should stick for any reason when the machine tries to overspeed, a device can be installed that will function to shutdown the compressor.

Drains. Part of this discussion was covered under Strainers, etc. Drains of ample size should be installed. After coolers condense considerable moisture that is carried in the air. This condensate must be carried away. It is good practice to make these drains (traps) automatic so that their function is not dependent on an operator.

Jacket-Water Failure Shutdown. In many systems, jacket and aftercooler water must be turned on manually. An automatic water valve shuts down the unit if water pressure fails.

Other Protective Devices. Where a compressor is installed in an inaccessible location or where the operator can make only daily trips to inspect the machine, it may be desirable to add additional protective devices. In the case of special operations, it is sometimes advisable to install a recording discharge gauge or a recording thermometer to record operating conditions.

Supreme Court upholds Illinois freeway act

The Illinois Supreme Court has reversed a lower court, which had dismissed a petition of the state department of public works to acquire, by eminent domain, certain land parcels and elements of ingress and egress. The decision in effect upholds the constitutionality of the state Freeway Act of 1953, and remands the court case in question to the lower court for rehearing.

• Traffic is driving faster, according to latest figures from the continuing Driver Behavior Study of the New York State Department of Public Works. Rural traffic on interstate highways now averages 49 mph., up one mile in a year. New York State traffic averages slightly faster than traffic in other Northeastern states, but less than traffic in the central and western regions. On 4-lane roads 60% of drivers average above 50 mph., the state legal limit, a sharp increase in a year's time.

Jumbo concrete culvert pipe installed

★ A line of 108-inch concrete pipe is being installed here on a West Virginia secondary road. It will replace an old truss span. Pipe was handled and placed in position by a crane, care being taken to bed each section properly aided by pneumatic tampers on the trench backfill

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What Causes Your Job Delays?

Some Equipment Management Problems on Highway Construction Jobs

By Fred B. Farrell

Chief, Highway Cost Section
Bureau of Public Roads

IT was not so long ago that the ¾-yd. power shovel, 2-up bottom-dump wagon, and single drum paver were in common evidence on highway jobs. Today, it is just as common to see the 1½-yd. power shovel, 13-yd. motorized dump wagon, and dual drum paver, along with a host of newly developed equipment, of which the counterpart did not even exist a few years back.

New problems in construction job management have accompanied these improvements. Circumstances which in former years enabled individuals with limited capital and construction experience to set themselves up as highway contractors have undergone considerable change. In order for contractors to survive in business, they must continually augment their "know-how." The array of items comprising this knowledge is imposing; among other things it includes (1) astuteness in contract negotiations and bidding; (2) knowledge of financing; (3) ability to expedite, locate sources of material, obtain discounts, and make advantageous trades and purchases; (4) awareness of job inspection practices, of legal provisions pertaining to on-highway movements of large equipment or heavy loads, and of tax legislation applicable to their business; (5) knowledge of construction methods; (6) ingenuity in devising cost-cutting techniques; and so on.

Contractors likewise must have certain facts or at least dependable rules of thumb by which it can be determined whether a job is making or losing money, and how much, and on what operations. This need is recognized even by those contractors who endeavor to maintain control of operations primarily through a knowledge of whether or not the check book balance at any given time is favorable.

Presented at the Highway Research Board Annual Meeting, Washington, D. C., January 9-11, 1953.

"How Are We Doing?"

There is no uniform pattern of job management which can be followed by all contractors to insure best results on any given job. Up to a certain point the more attention the contractor or competent superintendent can give personally to the job, the better the results will be, other things being equal. However, contractors who endeavor to run their jobs personally often find themselves tied up for extended periods on matters away from the job site. The obvious result is that the job suffers from lack of direction, production goes down, and costs go up. Other contractors who employ a job superintendent frequently limit his effectiveness by having him cover too many jobs, by not permitting him to make certain necessary decisions in handling the work, or by not keeping him "on his toes" through daily job performance and cost reports.

One fact, recognized by all contractors, is that a smooth fast-moving job will make more money than a slow-moving one beset by numerous delays and equipment breakdowns. The varying degree of success in keeping such delays and breakdowns to a minimum and in making the best of an unavoidably bad situation is largely attributable to relative effectiveness of job management. A measure of this effectiveness is the extent to which equipment can be kept in productive operation on its scheduled tasks during the course of any job.

Field studies made by the Bureau of Public Roads over the past five years on highway construction jobs have produced findings of considerable interest in this matter. These studies have been conducted in most States on approximately 140 separate highway jobs, for periods of about 3 weeks each, during the active highway construction season.[1] Construction jobs covered by these studies were selected largely at random and are reasonably typical of conditions that might be expected on primary road construction in rural areas.

On the series of jobs studied, construction operations were suspended due to weather (rain, snow, cold, wet grade, etc.) for nearly one-fifth of the normally scheduled working time, on the average. Because the amount of these shut-downs on individual jobs varied so greatly and because such delays are beyond the control of the contractor, weather delays have been excluded from the findings presented in this report.

It has been found that primary producing or "key" units of construction equipment—power shovels, scrapers, pavers, and so on (but excluding hauling units and auxiliary equipment)—are engaged on actual productive work[2] about 58 per cent of the total available working time, excluding weather delays.[3]

The remaining 42 per cent of the time is lost in various kinds of delays (interruptions to the routine cycle of operation), nearly half of which are "minor" delays of less than 15 min-

Table 1—Delays for Selected Types of Key Equipment

No. of units studied	Class of key equipment	Average extent of delays, percentage of available working time[1]		
		Major	Minor	Total
29	Asphalt plants	24	24	48
23	Dual drum pavers	20	24	44
40	Power shovels	16	30	46
68	Scrapers, crawler tractor-drawn	22	9	31
		27	15	42
74	Scrapers, rubber tired tractor-drawn	—	—	—
	Average (arithmetic)	22	20	42

[1] Weather delays are excluded.

[1] This program of study is under the direction of the Production Cost Unit of the Bureau of Public Roads. Field studies are carried out by engineers-in-training of the Bureau assigned to the Unit for 6 months during their 3-year training course to study construction and maintenance methods.

[2] Productive working time consists of those routine recurring cycle items which are basically essential to the operation of the equipment. A power shovel, for example, has four cycle items: (1) load, (2) swing, (3) dump, and (4) return.

[3] In this report, total available working time is the sum of (1) normal daily shift time plus (2) any additional time actually worked minus (3) down time due to weather. Thus, if a job had a normal scheduled shift time of 8 hours daily for 6 days a week, with 2-hours overtime on one of these days, and with 9 hours lost to rain or wet grade during the week, the total available working time would be 48 plus 2 minus 9, or 41 hours for this particular week.

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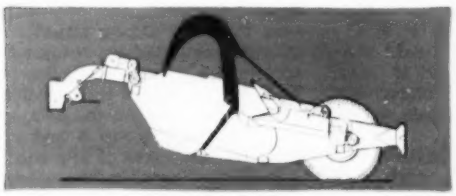

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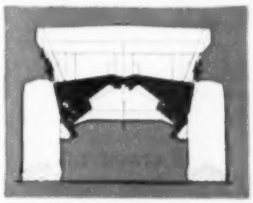

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utes each in duration.[4] Even on the best managed jobs these small delays take their toll of lost production. Although many of them can be measured only by a stop-watch, their cumulative effect may well be the difference between making or losing money by the contractor. When these small delays are incurred, the job ordinarily is in operation with its full complement of men and equipment and going expenses are at a maximum. It is during this time, also, that all operations on a job must be coordinated to the fullest extent in order to get the greatest possible production. Effectiveness of job management pays its largest dividends during these periods.

Longer Stoppages

The longer or "major" delays, of 15 minutes or more each in duration, account for little over half of all lost time on the average job. During many of these major delays, the job can be shut down temporarily to keep expenses to a minimum. Even so, detours must still be maintained, overhead continues, demurrage charges are incurred, and labor becomes dissatisfied. Ordinarily the only bright spot in such instances occurs when two delays take place at once—as, for example, when a piece of equipment can be given needed repairs during a rainy spell or while otherwise idle.

As might be expected, the extent of lost time varies somewhat according to the type of work and the class of key equipment. In Table 1 is shown the average extent of major and minor delays for five selected groups of equipment upon which the majority of field studies have thus far been made.

To obtain some indication of the relative effectiveness among contractors in keeping delays to a minimum on various jobs, the delays for each class of equipment were summarized for two groups: (1) Group A which consists of five jobs with the least delays and (2) Group B which consists of five jobs with the most delays. A comparison between group A and group B jobs would tend to show, other things being equal, the range in effectiveness of highway construction job management. Of course, it is impossible to select truly comparable jobs for purposes of such a comparison. Certain jobs, particularly those with many delays, have purposely been excluded from group B because of the existence of unusual or extremely difficult working conditions. The results presented herein should, therefore, not be viewed as absolute measures of differences in performance of "good" contractors versus "poor" contractors. Rather, the objective of the comparison is to reveal the approximate degree to which certain kinds of time losses, common to both groups, are actually experienced, and to indicate what categories of time losses warrant the greatest attention on the part of contractors in increasing the effectiveness of their construction job management practices.

Table 2 shows the comparison of group A and group B jobs with respect to the extent of total time losses.

Although the variables peculiar to the individual jobs are not disclosed by such a generalized comparison, the spread in the extent of delays listed in Table 2 suggests there is opportunity on many jobs to improve efficiency. To accomplish such improvement requires a knowledge of just what the principal trouble spots are for each type of operation. Overcoming these trouble spots is no assurance that an otherwise poorly managed job will automatically be converted from group B to group A. It will usually be found that as one source of delay is reduced, other delays will become more prominent and constant alertness to the changing situation is required if real and permanent benefits are to be achieved. Following are brief discussions of the principal time losses that comprise the delays shown in Table 2 for group A and group B jobs for each class of key equipment.

Asphalt Plants. In the operation of asphalt plants it was found, as shown in Table 3, that plant maintenance and repair and shortages of dried ag-

[4] In a sample of 20 typical projects, the duration of the average individual minor delay was about 50 seconds.

What the Stop Watch Told on 140 Jobs

- Equipment was idle an average of 1/5 of normal working hours due to weather.
- Shovels, scrapers, pavers—such "key" units set the job pace.
- Key machines were in production only 58% of the available "good weather" working time. (If your equipment does better, you are beating par!).
- Nearly half of the 42% lost time consisted of delays of less than 15 minutes each.
- Waits on trucks and wagons a prevalent weak spot in management. Worst delays often at plant end.
- On asphalt jobs, the dryer frequently a bottleneck.
- On concrete paving, insufficient batch trucks cut production. Ditto inept maneuvering of trucks (slow backing, etc.).
- On shovel work, maintenance and repairs the No. 1 time stealer.
- Contractors need to watch balance between hauling and excavating units, so that neither has to wait.
- Crawler-tractor-scrapers made best showing, due to least dependence on auxiliary equipment.
- Pull or push tractors shown to be a "must" with rubber-tired tractor drawn scrapers.
- On all kinds of highway jobs the biggest cause of lost time in workable weather was equipment maintenance and repairs.

Table 2—Extent of All Delays (Excluding Weather)

Group A and Group B jobs

Class of key equipment	Average extent of delays, percentage of available working time	
	Group A	Group B
Asphalt plants	27	66
Dual drum pavers	32	50
Power shovels	29	62
Scrapers, crawler tractor-drawn	12	39
Scrapers, rubber tired tractor-drawn	23	53

Table 3—Delays to Asphalt Plants

Group A and Group B jobs

Nature of delay to asphalt plant	Percentage of available working time	
	Group A	Group B
Plant maintenance and repair	3	15
Lack of hauling units	8	11
Wait on dryer	4	11
Shortage of asphalt	2	8
Other (personal, paving site delays, change screens, draw bins, etc.)	10	21
Total	27	66

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Table 4—Delays to Dual Drum Pavers

Group A and Group B jobs[1]

Nature of delay to dual drum paver	Group A Percentage of available working time	Group B
Lack of batch truck at paver	4	10
Dumping batch in skip	2	9
Shortage of materials at plant	—	3
Repair and maintenance of paver	2	5
Other (wait on other operations, moves, operator delays, etc.)	24	23
Total	—	—
	32	50

[1]For jobs on which only one paver was used.

Table 5—Delays to Power Shovels

Group A and B jobs

(no adjustment for class of material)

Nature of delay to power shovel	Percentage of available working time Group A	Group B
Shovel repairs and maintenance	6	33
Insufficient hauling units	9	9
Hauling unit operation delays	2	3
Other (moves, clean-up work, rocks, roots, etc.)	12	17
Total	—	—
	29	62

gregate and asphalt accounted for most of the differences in time losses between group A and group B jobs.

Delays due to lack of hauling units appear somewhat large for both groups. An obvious remedy for excessive plant delays caused solely by shortages of hauling units is the acquisition of more units. However, on jobs where such delays were observed to be less than 2 per cent of the available working time, the hauling units themselves spent about 30 per cent of their round trip waiting in the plant to obtain a load. This situation, wherein small delays to the plant may be offset by large delays to the hauling units, presents a critical problem in managing hauling unit operations and in determining the proper balance between plant capacity and hauling unit capacity under any given set of conditions.

Waiting on the dryer to dry the aggregate also accounts for a substantial part of the difference in time loss between group A and group B jobs. Although it usually works almost continuously to keep the plant in operation, the capacity of the dryer is a significant factor affecting production on many plant setups. To overcome this situation many contractors have modified original dryer equipment or added secondary dryer units to the plant.

Concrete Job Challenging

Dual Drum Pavers. Portland cement concrete paving jobs afford wide opportunity for the exercise of good management practices. Some contractors have developed the integration of the numerous processes involved to a remarkable degree; others are continually running into headaches from which there seems to be no relief. Comparison of the group A with group B jobs, using one dual drum paver, appears in Table 4, above.

Two of the principal causes of delays on the group B jobs are associated with the batch trucks. It is common practice to provide a slight surplus of batch trucks in order to minimize as much as possible the delays caused by lack of material at the paver. Group A jobs usually had from 2 to 3 batch trucks waiting in line at the paver, whereas on group B jobs the number of waiting trucks at the paver averaged from 1 to 2.[5]

The extra margin of safety realized by the additional truck at the paver site is an important factor contributing to the difference in delays to the paver between group A and group B, particularly under conditions where trucks tend to be temporarily delayed or "bunched up" elsewhere than at the paver.

Excessive and constantly recurring delays caused by slow backing of the batch trucks onto the paver skip, or in discharging the batch into the skip, are largely unwarranted. The coaching of truck drivers or the hiring of a capable dump man (or spotter) to direct the batch trucks in their backing and dumping operations at the skip will pay dividends in keeping delays from such causes to a minimum.

Studies were also made on five jobs, each of which employed two dual drum pavers operating simultaneously at the same site. Such jobs require a high degree of coordination because of the potentially high production rate involved. Delays on these jobs amounted to 52 per cent of the available time and closely paralleled those, both in kind and amount, of group B jobs using one dual drum paver. The most significant difference was in time losses due to shortages of materials (principally cement) which amounted to about 7 per cent of the available time for the 2-paver jobs as compared to 3 per cent of the group B jobs using one dual drum paver.

Power Shovels. Power shovels, ranging in size from $1\frac{1}{4}$- to $2\frac{1}{2}$-cubic

[5] These are job average figures which do not reflect the day-to-day conditions. For example, on some days a job may have an oversupply of trucks; on other days there may be a serious shortage; yet the "average" supply may indicate an excess. Specific appraisal of the effectiveness of job management can, of course, be accomplished only by detailed study and analysis of each job.

Table 7—Delays to Crawler Tractor-Drawn Scrapers

Group A and Group B jobs

Nature of delay to crawler tractor-drawn scrapers	Percentage of available working time Group A	Group B
Maintenance and repair	6	26
Await pusher	1	3
Other (personal, stuck, moves, finishing, etc.)	5	10
Total	—	—
	12	39

Table 8—Delays to Rubber Tired Tractor-Drawn Scrapers

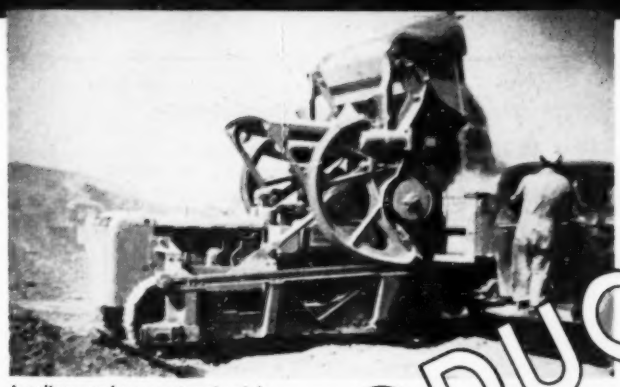
Group A and Group B jobs

Nature of delay to rubber tired tractor-drawn scrapers	Percentage of available working time Group A	Group B
Maintenance and repair	5	28
Await pusher	7	15
Other (personal, stuck, moves, finishing, etc.)	11	10
Total	—	—
	23	53

Table 6—Delays to 8 Power Shovels

Operating in Blasted Rock

Nature of delay to power shovel	Percentage of available working time Four power shovels having the lesser amount of delays	Four power shovels having the greater amount of delays
Shovel repairs and maintenance	8	13
Insufficient hauling units	8	9
Hauling unit operation delays	4	6
Handling large rocks	1	7
Other (moves, blasting, clean-up work, etc.)	14	14
Total	—	—
	35	49



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Construction job in frozen ground.

yards, experience numerous delays, many of which are difficult to catalog in a fashion that will enable significant comparisons to be made of the relative effectiveness of job management. Differences in job conditions, terrain, type of excavation, and so on, make such comparisons difficult. The kind and magnitude of delays experienced by various sizes of shovels were found to follow about the same general pattern. A selection of reasonably typical group A and group B jobs resulted in the data shown in Table 5.

Shovel repair and maintenance loom as the most significant types of delay that distinguishes group A jobs from group B jobs. For no other class of equipment are repair and maintenance delays in group B of such proportions.

Most of the group B jobs were in "hard digging" involving a considerable amount of ledge rock, shale, and blasted rock. Off-hand this circumstance might lead to the conclusion that the class of material rather than effectiveness of job management accounts for the occurrence of large delays to shovel breakdowns on group B jobs. Although this is true to a large extent, the effectiveness of blasting is, in many cases, a contributing factor in classification of material, and one that is subject to considerable control by the contractor. Evidence of this fact is that one of the shovels with the least amount of delays in group A was one which worked in well-blasted limestone.

In order to eliminate, as much as possible, the effect of variations of material upon the comparison, a group of eight shovels was selected, each of which operated in blasted rock. The four shovels with the lesser amounts of delay were compared with the other four having the greater amounts of delay. The findings resulting from the comparison of these particular eight shovels are shown in Table 6.

Rock Causes Delays

If data on a larger number of jobs involving the same general class of material were available for comparison, the differences in extent of delays would in all likelihood be greater than those shown. The comparison shown in Table 6 does, however, reveal significant differences in effectiveness of job management. The amount of time loss, 1 per cent, due to handling large rocks on the four jobs with the lesser delays is of particular interest, because of its relatively small extent. In general, it is logical to expect that larger delays due to handling large rocks would have some effect on increasing time losses due to shovel repairs and maintenance. Although it is impossible to trace direct causes and effects, this expected relationship is borne out in Table 6.

In both Tables 5 and 6, it is shown that appreciable amounts of time are lost due to hauling unit shortages. It would appear that the simple expedient of adding more hauling units would improve job performance. To a certain extent this is true; however, as the number of hauling units increases, their own lost time begins to mount. This is revealed by comparing five jobs having the greatest amount of hauling unit shortages with five jobs having the least amount of such delay. On the five jobs having the most, 18 per cent average, hauling unit shortage delays to the shovel, the time lost by the hauling units while waiting to be loaded at the shovel site was 8 per cent of total available working time of the hauling units. At the other extreme, on the five jobs having the least, 4 per cent average, hauling unit shortage delays to the shovel, the time lost by the hauling units was 21 per cent.

Thus, other things being equal, it may be concluded that the addition of hauling units for the purpose of reducing delays to the shovel due to hauling unit shortages can be expected to be accompanied by a corresponding increase in lost time to the hauling units themselves while waiting to be loaded at the shovel site. The problem resolves itself, therefore, into an economic one of determining amount of hauling equipment consistent with high shovel production that will result in the lowest unit cost under any given set of conditions.

Keeping Scrapers Going

Crawler Tractor-Drawn Scrapers. As a general class crawler tractor-drawn scrapers experience the least amount of delays, amounting to 31 per cent of the available working time. This may be attributable in part to the fact that this class of equipment has a minimum of dependency upon auxiliary equipment throughout its routine cycle of operation. A comparison of group A and group B jobs is shown in Table 7.

Maintenance and repair of the scraper and crawler tractor account for the greatest proportion of the difference in time losses between group A and group B. Although both groups involved jobs where "hard" and "easy" digging were encountered, it is possible that if the job conditions were absolutely comparable the spread in maintenance and repair time losses would be somewhat less than is shown in table 7. It is apparent, however, that such losses show sufficient spread and are of sufficient magnitude to afford conclusive evidence of being one of the major problems generally experienced by this class of equipment.

As a general rule, crawler tractor-drawn scrapers can self-load fairly satisfactorily if a pusher is not available. However, a pusher unit can frequently be used to advantage. The delays due to waiting for the pusher in such instances are small, but as might be expected they are larger on the group B jobs.

Rubber Tired Tractor-Drawn Scrapers. Scrapers units powered by rubber tired tractors experience delays due to repair and maintenance of approximately the same magnitude as the crawler tractor-drawn scraper units. The rubber tired tractor units are dependent upon pushers to a greater extent, however, as revealed in Table 8.

In practically all cases a pusher (or puller) is a "must" for insuring satisfactory performance of rubber tired tractor-drawn scraper units. Studies on pusher operations reveal that assistance can be given to 24 scraper loadings per hour, on the average. Of course, the tendency of scraper units to "bunch-up" occasionally in the cut will result in delays to the scraper even on the best managed jobs.

In Conclusion

The largest single source of delay (other than weather) common to all classes of equipment involves the repair and maintenance of the equipment itself. Approximately 30 per cent of all delays (average for all jobs, excluding weather) is attribut-

Special Committee on Highway Equipment

A special Committee on Highway Equipment of the Highway Research Board was appointed during 1952, for the purpose of working in conjunction with sources of information on equipment utilization. These sources include the Highway Cost Section and the Production Cost Unit of the U.S. Bureau of Public Roads.

Chairman of the committee is Fred B. Farrell, Chief, Highway Cost Section, Bureau of Public Roads; members include A. L. Donnelly, Engineer of Roadway Maintenance, Connecticut State Highway Department; H. H. Harris, Maintenance Engineer, Virginia Department of Highways; Harold F. Hess, Executive Vice President, Construction Industry Manufacturers Association; P. E. Masheter, Assistant Chief, Bureau of Construction, Ohio Department of Highways; and J. F. Tribble, Assistant Construction Engineer, Alabama State Highway Department. M. J. Kilpatrick, head of the Production Cost Unit of the BPR is chairman of a subcommittee on job management, which committee is to be expanded to include other members, particularly contractors.

able to this cause. Although costly if carried to extremes, acquisition of new equipment is excellent insurance of dependable mechanical performance and ordinarily will avoid much of the "down" time common to older equipment. However, new equipment, by itself, will not insure top job performance, since many contractors with older equipment can outperform others having newer or better equipment simply by following better job management practices.

The problem of keeping equipment in satisfactory repair is a critical one. Mistreatment of expensive equipment by careless or inexperienced operators must frequently be conducted by contractors, simply because of a shortage of capable and conscientious operators. There is a general scarcity, too, of dependable mechanics for servicing and repairing of equipment. These are circumstances which cause highway contractors to place a higher premium on the long-term ruggedness, durability, and "built-in maintenance" features of heavy equipment rather than on its first cost or apparent performance characteristics.

Other delays which affect various jobs tend to fall in certain well defined categories, depending upon the particular class of work. Supply of materials to asphalt plants, hauling unit problems on paving and power shovel jobs, and pusher problems on scraper grading warrant special attention. The differences in time losses between group A and group B jobs give substantial evidence of opportunity for improvement in effectiveness of job management on many highway construction jobs.

15 contractors bid on soil-cement project

More than 30 contractors took out plans for a 21.5-mile soil-cement road advertised by the Wisconsin State Highway commission. Fifteen bids were submitted for the 289,000 sq. yd. project which is located in Jackson County near Black River Falls.

John Dieseth of Fergus Falls, Minn. was low bidder at $282,000, an average of 95.6 cents per sq. yd. of roadway 22 ft. wide by 6 in. thick.

The exceptional interest shown in this project is considered particularly noteworthy in view of the unusual construction details involved. The terrain is relatively level, consisting of a sandy plain, but is dotted with many marshy areas. Transportation of water and the 36,000 bbl. of portland cement required will be a particularly difficult operation over this loose sandy soil. The contractor probably will need special equipment to facilitate hauling his materials.

Tiller Appointed Assistant Sales Manager. J. H. Tiller, formerly district representative in South Central area for Gallion, has been appointed assistant sales manager of The Gallion Iron Works & Mfg. Co., Gallion, O.

★ Before and after rebuilding the floor—a stronger bridge, a safer roadway, at a fraction of the cost of a new bridge

New Life for Old Bridge

by Replacing Antiquated Floor System

Structural-plate bridge flooring used on Third Avenue bridge, Huntington, W. Va., in modernization for heavy arterial traffic.

By J. N. Wallace

District Engineer
State Road Commission of West Virginia

LATE in 1951, the State Road Commission of West Virginia was faced with a situation involving the Third Avenue Bridge in Huntington, W. Va.

This bridge over the Guyandotte River was built more than 45 years ago and originally served a farming community northeast of Huntington along the Ohio River and the town of Guyandotte. It now carries the heavy traffic of State Route W. Va. 2 which runs the entire length of the State along the Ohio River from Kenova to Chester.

This bridge is 595 ft. 6 in. long, has a roadway width of 29 ft. 6 in., and one sidewalk 8 ft. 6 in. wide on the upstream side. It consists of 322 ft. and 140 ft. steel through truss spans and seven steel I-beam spans.

The wooden flooring on the bridge was deteriorating rapidly, causing excessive maintenance costs and necessitating closing the bridge. Something had to be done quickly. Because of the age of the bridge, thorough inspection was made by representatives of the bridge Engineer of the Road Commission and also by the College of Engineering of West Virginia University.

The steel through trusses were in good condition as well as the stone masonry sub-structure. Likewise the steel I-beam spans were considered satisfactory with exception of the concrete footers under the tower bents. Most of the deterioration centered on the stringers and depressed section, caused by removal of tracks over which street cars operated for many years.

The problem that then confronted the Commission was whether the bridge should be replaced on account of its age and its outmoded type of design, or whether to make necessary repairs if the remaining years of usage would compensate for the investment involved.

The economic situation at the time forced a decision. Government controls were on steel, a shortage existed at the time, and a steel strike impended. It was decided to proceed with necessary repairs, replacements and the installation of new flooring both on the roadway and the sidewalk, using structural steel plate which would stiffen the entire structure and provide a noiseless deck. Fortunately, the suppliers had enough stock on hand to complete the flooring order, and it was therefore only a short while until they had fabri-

★ Wood floor planks were removed by a dozer, stringers repaired, and prefabricated lengths of structural plate bridge flooring moved into place

cated the 29 ft. 6 in. lengths, using 7-gauge steel with end dams to hold the bituminous concrete.

As soon as steel was delivered to the site, the wood flooring was removed by using a bulldozer, with trucks carrying off the old timber.

Placing New Floor

Stringers were sand-blasted, painted, re-aligned, and replaced as necessary. All concrete footers on the steel I-beam spans were covered with reinforced concrete to a level that compensated for the raised level of the river bottom caused by alluvial elevation through the years.

As the steel flooring was delivered in the required widths, each section of the roadway plate was moved into position by means of a crane. After the plate was correctly positioned, it was anchored to the stringers by tack welds. Subsequent plates were similarly placed and welders completed the welding to the stringers together with 3-in. bead welds on overlapping joints midway between each pair of stringers.

Upon completion of the steel floor installation, a hot-laid asphaltic concrete bottom course was rolled into the trapezoidal corrugations of the steel plate and finally a hot-laid asphaltic concrete wearing course was applied to complete the job.

The installation on the sidewalk was similarly handled, except that 12-gauge plate was used, and a sand-asphaltic mix was applied for the walking surface, which was covered immediately after rolling with a dry application of Portland Cement to fill the voids.

The project cost the State of West Virginia $92,690, a small fraction of the cost of a new structure. Maximum legal loads now roll over the bridge quietly and safely. The structural steel plates were supplied by United Steel Fabricators, Inc., of Wooster, Ohio, whose engineers and technicians assisted in working out many details of design and construction.

County priority method

A priority rating system for county road construction has been devised by engineers of Hartford County, Md., according to the National Highway Users Conference. The program adopted involves scheduling the improvement of 320 miles of gravel and slate base roads of about equal condition, the priority being established on a point system taking into account the number of residences and the daily vehicle count for each section of road, and also the use of the road as a school bus route, as a link with an important road, and as a part of the federal-aid secondary system.

New Koehring Distributor. Ray C. Call Co., South Charleston, W. Va., has been appointed distributor by Koehring Co., Milwaukee, Wis., for the state of West Virginia.

Use of air-permeameter for determining porosity of bituminous pavements

By Z. T. Zia. M.S. in Civil Engineering, 1952, University of Washington. Highway Research Abstracts, March, 1953.

The conventional method of determining the porosity of bituminous pavements has the disadvantage of requiring considerable time and precise laboratory measurements. The purpose of the investigation reported in this thesis was to determine if a satisfactory air-permeability test can be made in the field with a properly calibrated air-permeameter. Porosities of both asphaltic concrete and sheet-asphalt samples of various thicknesses were first determined by the conventional method on the basis of theoretical maximum densities.

Then the air-permeability tests were performed on each of the samples at room temperature, and the time readings for the reductions of air pressure from 4 psi. to 0.5 psi. in the permeameter were recorded. Good correlations exist between the porosities and air-permeability, and correlation curves can be used satisfactorily to determine slab porosity.

This is particularly true with respect to a newly constructed pavement because the permeameter can be placed directly on the pavement surface to determine porosity and air-permeability of the paving mat. It is suggested that the effects of the temperature of testing should be investigated before this testing method is practically applied in the field.

Drafting by model method

A reference of 133 pp. has been published, giving a complete course in drafting by a method which employs an entirely new technique of instruction. The model method, as it is called, makes use of cut-out 3-dimensional models accompanying the text, with every detail planned for instructional purposes to tie in with the book's illustrations. Entitled "Drafting by the Model Method," by John B. Musacchia, Henri A. Fluchere and Melvin J. Grainger; price $3.50 postpaid, paper, $5.00 cloth. Address remittance to Arco Publishing Company, 480 Lexington Avenue, New York 17, N. Y.

Bridge stress distribution

"Distribution of Load Stresses in Highway Bridges"; Research Report 14-B, the Highway Research Board. This 85-page publication contains six papers sponsored by the Board's Committee on Bridges and presented at the 31st Annual Meeting:

1. Effect of Trucks upon a Few Bridge Floors in Iowa in 1922 and in 1948—Almon H. Fuller, professor of civil engineering, Iowa State College.

2. Test on Rolled-Beam Bridge Using H20-S16 Loading—G. M. Foster, chief deputy commissioner, Michigan State Highway Department.

3. Load Distribution between Girders on the San Leandro Creek Bridge—T. Y. Lin, associate professor of civil engineering, and Robert Horonjeff, research engineer, Institute of Transportation and Traffic Engineering, University of California.

4. Load Distribution on Highway Bridges Having Adequate Transverse Diaphragms—G. S. Paxson, bridge engineer, Oregon State Highway Department.

5. Distribution of Loads to Girders in Slab-and-Girder Highway Bridges: Theoretical Analyses and Their Relation to Field Tests—C. P. Siess, research associate professor, and A. S. Veletsos, research associate, Department of Civil Engineering, University of Illinois.

6. Reactions of a Two-Span, Skewed, Rigid-Frame Bridge—Gordon P. Fisher, associate professor of civil engineering, Cornell University, and Walter C. Boyer, assistant professor, Civil Engineering Department, The Johns Hopkins University.

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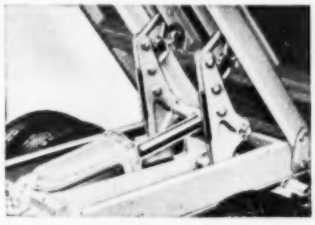

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★ Scraper spreads 6-inch lift of sand for frost resistant base on county road

Scrapers Build County "Sand-Lift" Roads

By W. H. Taylor
Highway Commissioner
Chippewa County,
Chippewa Falls, Wisconsin

BITUMINOUS hot mix surfaces on foundations designed for free drainage and frost resistance are proving the answer to the increasing traffic needs of Chippewa County in Wisconsin.

During my 28 years as County Commissioner, I've seen the freeze-and-thaw cycle (common to all northern states) make county road maintenance a tough problem. I believe that we have found the solution to that problem: Make use of the sand lift when building county roads. It's a great drainage aid. Here's the way we do it.

After the subgrade has been correctly crowned, place a 6-inch lift (layer) of sand on the subgrade. The cleaner the sand, the better, since clean sand is a pervious material through which water can drain easily. Then place a second 6-inch layer, consisting of gravel crushed to 1-inch dimension, on top of the sand lift. On top of this goes a 2-inch bituminous mat 20 feet wide. Shoulder-to-shoulder width of the road is 30 feet. We have our own hot mix plant in Chippewa County.

These layers of pervious material underneath the surface mat, aided by the draining effect achieved by having the subgrade properly crowned, permit water to drain off into the side ditches. With the sand lift and its layer of gravel thus preventing accumulation of water underneath the black-top, freezing and thawing of accumulated water is eliminated, which does away with the occurrence of damaging frost boils underneath paved surfaces.

★ Belt loader used to fill scraper bowl at pit

Roads Built Up

We've found that Chippewa County's use of sand lift in road building operations possesses another advantage. By building up the height of the roads, their top surfaces are brought above the general contour of the surrounding land. This permits wind to sweep the snow off the road as soon as it falls, which eliminates, to a great extent, blocking of county roads by snow and attendant snow removal operations.

Chippewa County is fortunate in having "natural" material in large quantities available for highway operations. Glacial sand and gravel are abundant in most parts of the county, so all we have to do to get the material we need is to establish roadside borrow pits.

To obtain needed sand and gravel for road construction purposes, Chippewa County uses a fleet of six 7-yard-capacity LeTourneau Model D Tournapulls. These machines, for Winter operation, are loaded by belt conveyor from the crusher at the pit. When we timed them on the job a while back, they were making a one-way haul of 2.1 miles, averaging 3 loads per hour. These rigs with electric control spread in controlled lifts, turn at the end of the spread, and return for another load.

With base material being obtained from pits at scattered locations, we have found that these scrapers are ideal for this type of operation. They travel from location to location under their own power. They don't have to be transported by trailer. On arriving at the job, they go to work im-

★ Sand life, placed by scrapers, is down. Next step is placing of 6-inch layer of crushed gravel

★ Newly surfaced section of highway in Chippewa County, with shouldering work yet to be done

mediately. They're mounted on big low-pressure rubber tires, so they travel over existing roads with no damage to the surface. We put the ability of scrapers to excavate their own loads to good use when we come upon bad spots in roads we're working on. They muck out such spots and then bring in suitable fill material.

As we go along on road jobs, we make basic improvements as they are needed, such as the establishment of minimum sight distance of 1,000 feet, realignment of curves to permit travel at 45 mph., etc.

We've found that it pays to plan far ahead on our road improvement and maintenance program. Wisconsin winter weather being as severe as it is, outside operations often come to a standstill. During such periods, we hold on to our experienced scraper operators by putting them on machine overhaul work inside the shop. By thus maintaining employment for the men, we have operators available when the weather moderates enough to resume work on the roads. This means that we have qualified operators available at all times—men who are familiar with the machines and who require no breaking-in period, as would be required of men newly-hired to train as operators.

Why Better Roads Are Needed

We have to have good roads to accommodate the milk trucks on their pick-up routes from farm to processing plant. Three large dairy plants are located in Chippewa County alone.

★ W. H. Taylor

★ Bad spots in county roads, such as this low, wet area, are mucked out and fill in with sand as road building operations go forward

School busses also are consistent users of the county trunk road system during the school year. Pulp wood hauling also is an important industry whose trucks haul from forest to paper mill. Wood also is delivered for furniture manufacture. For these reasons and for others —vacation traffic for one—excellent road surfaces which are good the year around are of prime importance to us. The methods heer briefly outlined have helped us add to our all-year mileage at minimum cost.

Contract shoulders work cheaper in Oklahoma

Growing grass on highway shoulders to forestall erosion can be done cheaper by contract than by state maintenance crews, the Oklahoma state highway commission has learned. In an effort to reduce operating expenses the commission picked out 313 miles of shoulders and asked for bids on sodding and seeding. The job was estimated to cost $510,702 by maintenance forces. Combined low bids showed contractors willing to perform the task for $397,951 or $112,751 less.

Leading road builders whose contracts often include shoulder sodding, submitted 55 bids. State Highway Director C. A. Stoldt says the commission's next new departure in maintenance work will be letting shoulder mowing to contract.

New technical bulletins on cranes, shovels, draglines

The Power Crane and Shovel Association has issued Technical Bulletin No. 4, entitled "Power Cranes, Shovels and Draglines—Attachments, Traction and Operation."

This 60-page bulletin, replete with tables, diagrams and charts, is the fourth in a series on the operation and maintenance of excavating equipment. It is valuable as text material for engineering colleges, students, professional engineers, contractors, operators and others dealing with excavation and materials handling problems.

There are chapters on such subjects as available attachments, selecting the shovel or boom attachment, selecting the right crane boom and load dropping equipment, clam shell attachments, pile driving, magnet cranes, rock tongs and grabs, dragline attachments, backbone attachments, how to set up and operate the shovel for best efficiency, similar chapters for the other forms of excavator equipment.

Copies of this bulletin may be obtained by sending $1.00 in U. S. stamps, money order or bank draft to the Power Crane and Shovel Association, 74 Trinity Place, New York 6, N. Y., U. S. A. Please give the nature of your business and your title.

Traffic Zoning Bulletin

Zoning for Truck-Loading Facilities; Bulletin 59. This bulletin deals with requirements for off-street truck-loading-and-unloading facilities in zoning and other local ordinances. Detailed analysis is made of the truck-loading requirements of 66 local ordinances.

The growth of truck-loading requirements since their earliest known inception, in the city of Memphis in 1927, is traced. Attention is called to the agencies responsible for the administration of zoning requirements and suggestions are made for the improvement of administration.

The extent of the loading requirements for each different type of use in each city included in the study is shown in detail and is discussed in general for each use. Uniform standards or requirements have not been recommended, largely because reliable data upon which to base such suggestions are unavailable. It is pointed out that the need for loading facilities may vary with the economic characteristics of the region, the size and nature of the city, and other local peculiarities. Four alternative administrative methods for determining the necessary amount of loading facilities, consequently, are suggested, with a recommendation for desirable procedure.

The size, location, and design features of loading accommodations are discussed, with recommendations concerning each item. Penalty provisions are also shown. The economic implications of adequate loading facilities is pointed out, with outstanding examples of the recognition of this important aspect.

A model for a section in a zoning or other local ordinance to require provision of off-street loading facilities is included for the benefit of those seeking guidance.

Available on request to Highway Research Board, 2101 Constitution Ave., Washington 25, D. C.

New Davey District Manager. R. G. Myers has been appointed southwestern district manager of the Davey Compressor Co., Kent, O.

More Road Funds Are Sought in Many States

With the problem of how to raise additional revenue for highway modernization continuing as one of the most widely considered issues in state capitals throughout the country, the number of states turning to further increases in highway-user taxes or borrowing, or both, is increasing.

New highway bond issues have been authorized (as of early in May) by the legislatures of Maryland, New Hampshire, North Dakota, Oregon, Tennessee and Washington. Proposals for new bond issues or other forms of borrowing for highway modernization were killed in Colorado, Idaho and Iowa, but are pending at this writing in California, Connecticut, Delaware, Ohio, Pennsylvania and Vermont.

Bills to increase gasoline tax rates have been enacted in Iowa and Maryland and vetoed in Utah. Such proposals are pending in California, Connecticut, Delaware, Florida, Massachusetts, Michigan, Nebraska, Ohio, Oklahoma, Pennsylvania, Texas and Wisconsin, but were killed or dropped in Colorado, Idaho, Indiana, Kansas, Minnesota, Montana, New Mexico, New York, North Dakota, South Dakota, Washington and West Virginia.

Legislation extending added gasoline taxes imposed on a "temporary" basis has been enacted in Colorado, Kansas, Nevada and South Carolina, and is pending in Oklahoma and Pennsylvania. Bills proposing gasoline tax reduction were killed in Colorado and Minnesota and pending in Delaware, Massachusetts and Texas.

New Truck Taxes

New laws expected to have the effect of deriving increased state revenue from the trucking industry have been enacted in Idaho, Montana, New York, North Dakota and South Dakota. Similar proposals are pending in California, Connecticut, Illinois, Maine, Nebraska, New Jersey, Ohio and Wisconsin, but were killed in Arkansas, Colorado, Indiana, Kansas, Maryland, Massachusetts, North Carolina, Oklahoma, Utah and West Virginia. Bills to reduce truck taxes are pending in Illinois.

Most significant development in the field of truck taxation is the failure thus far this year of any state to enact a new levy of the ton-mile variety, despite the widespread introduction of such proposals. Idaho's ton-mile tax was replaced with a new combination license plate and mileage tax system, and proposals are pending to replace Wisconsin's ton-mile tax with other forms of levies. New York's weight-distance tax was broadened and North Dakota's ton-mile tax rates will be increased. Several new

ton-mile tax proposals are still pending at this writing.

Higher registration fees for passenger cars have been enacted in Maryland and South Dakota. States in which such proposals are pending include California, Delaware, Nebaska and Ohio. Among the states in which such bills were killed are Idaho and North Dakota.

New Administrative Set-ups

Bills changing the structure of highway administrative agencies have been enacted in Arkansas, Indiana, Montana, North Carolina and Wyoming. Such measures are pending in California, Florida, Maine and Ohio, and were killed in Maryland and South Dakota.

States in which legislation has been enacted to provide for new interim studies of highway financing and related problems include Arizona, Minnesota, New Jersey, West Virginia and Wyoming.

Twelve states adopted resolutions memorializing Congress to repeal the federal gasoline tax in order to permit its replacement with increased levies.

Proposed state constitutional amendments to outlaw the diversion of highway-user tax receipts to non-highway purposes, similar to provisions already in the charters of 24 states, were given initial approval in Maryland and Tennessee and final legislative approval in Wyoming, where the issue will go on the ballot.

States in which the use of non-highway tax revenues for highways has been given legislative approval include North Dakota and South Dakota. Similar proposals are pending in several other states, including Ohio and Vermont.

Increased allocations of state-collected highway-user tax revenues to political subdivisions has been widely proposed this year, with the most significant enactment of this type thus far being a new Tennessee law allocating about $7,000,000 a year of state gasoline tax receipts to cities for street improvements.

Colorado Adopts Long-Range Thinking

The Colorado Legislature took a step toward a new long-range highway program, with the enactment of bills clearly designating types of highways to be supported by state and federal funds and setting up a new system of distribution of road tax revenues.

Reports of annual road and streets programs, with project-by-project listings on a priority basis, are required from the State Department of Highways, and from counties and cities under one of the new Colorado laws.

The legislation specifies the use of the sufficiency rating procedure by the State Department of Highways, and states that sufficiency ratings or

other comparable methods may be used by county and city departments in compiling their annual reports.

A special session may be called in the fall to consider long-range highway financing. The regular session failed to approve Governor Thornton's proposal to authorize issuance of anticipation warrants against future highway revenues as a means of financing an expanded construction program. Other revenue-raising measures which may be revived if a special session is called include proposals for increased taxes against trucks and other highway users.

Bills enacted by the regular session include a measure continuing a 2-cent "temporary" gas tax increase, which leaves the rate at 6 cents per gallon.

Public Relations Stressed in Employee Letter

The following statement was seen tacked on the wall of a field office of the Ohio Department of Highways. The Roads and Streets editor read it, thought it worth passing along. It was issued recently to all employes in the form of a letter from S. O. Linzell, Director of Highways.

* * *

Dear Fellow Worker:

This year every employee of the State Highway Department was judged by his supervisor on nineteen different phases of his work. One of these is "public relations."

To many of you this is the first time you have realized that "public relations" was a part of your job. Perhaps you are in doubt as to what is expected of you in regards to dealing with the public.

It is essential for every enterprise, both public and private, to maintain the respect and goodwill of the community. You are the representatives of the State Highway Department in your neighborhood and town. Your public relations job is even more important because the people of Ohio are interested in the highways, and as taxpayers they have a right to question the way their tax money is being spent.

We know that we are doing a good job, but it is up to us to tell the public about our accomplishments, problems, and responsibilities in order to receive public support for our program.

Under the heading of public relations everyone was rated as to his methods of meeting and dealing with the public. Is he courteous? Does he avoid sarcasm? Does he give the public a good impression of the department? Is he helpful? Has he the ability to work harmoniously with co-workers and supervisors? Is he tactful? Does he have a pleasant disposition? Does he work diligently?

Very few of us can answer "yes" to all of these questions even when we are in our own homes, so it is safe

to assume that we are sometimes lacking in our capacities as representatives of the Ohio Department of Highways.

The best advertisement for the department is the employee who takes pride in his job, and never belittles his work or the work of others. He does a creditable job in private and business life, and he takes part in civic functions. He is constantly striving to improve himself, and by doing so he improves his work and his department. Remember—you are the state highway department in the eyes of others.

Most highway personnel have done an excellent job of creating goodwill for our organization. If you will be public relations conscious, you can further improve the respect of the citizens of Ohio for their highway department. Remember—we are dependent on them for the success of our program.

Very sincerely yours,
S. O. Linzell, Director

Minnesota study of joint and crack sealing

"Resealing Joints and Cracks in Concrete Pavement (Minnesota)," Highway Research Board Bulletin No. 63, describes an experimental project conducted in Minnesota to study cutting, cleaning and resealing of joints and cracks. The study includes methods, equipment, materials and costs.

Following successful results of this experiment, the Minnesota Department of Highways maintenance division awarded contracts for sealing approximately 85 miles of pavements with hot-poured rubberized asphalt in 1950, and 333 miles in 1951. About 390 miles was planned for 1952. [See article, "Joint Sealing and Recleaning Performed by Contract," by J. C. Robbers; Roads and Streets, February, 1951.]

The results reported in this bulletin appear to justify the following conclusions:

(1) Joints and cracks can be effectively sealed with hot-poured rubber-asphalt under proper placement conditions.

(2) Mechanical agitation and positive temperature control must be provided on the melting and application units.

(3) All dust and loose concrete must be thoroughly removed prior to placement of the filler material.

(4) Overheating of the filler material must not be permitted.

(5) This type of work lends itself to being done by contract.

(6) A satisfactory method of payment for the major items is on the basis of unit price of filler material in place, including cutting, cleaning, material and placement.

Copy of bulletin No. 63 is available by writing the Highway Research Board, 2101 Constitution Ave., Washington 25, D.C.

Highway-materials surveys

The Highway Research board has issued as Bulletin 62 a 118-page compilation of papers on the above subject.

The problem of obtaining suitable aggregates and granular materials for highway-construction purposes under present economic conditions is a major issue at the present time in many states and fast becoming one in others. Present sources of acceptable highway materials under present demands will become completely exhausted, and new sources must be located. With these facts inevitable, the Committee on Materials Surveys was established by the Board to study this problem.

The work of the committee concerned itself with all aggregates emanating from natural gravel deposits or rock formations and directed its activities primarily to three specific objectives: (1) to conduct a worldwide survey to determine material-survey methods employed by the states and foreign countries; (2) to prepare a bibliography on the subject; and (3) to assemble and publish the most useful information consummated under the committee's work program.

This publication presents in a symposium of four papers the latest information and developments in the field of material surveys:

1. How to Use Airphotos and Maps for Material Surveys—Olin W. Mintzer and Robert E. Frost, Joint Highway Research Project, Purdue University.

2. Geologic Considerations in Relation to a Materials Survey—James L. Young, Jr., Geologist, Humble Oil Company, and L. E. Gregg, Associate Director of Research, Kentucky Department of Highways.

3. Geophysical Methods of Subsurface Exploration Applied to Materials Surveys—R. Woodward Moore, Highway Engineer, Physical Research Branch, Bureau of Public Roads.

4. Material Inventories—Tilton E. Shelburne, Director of Research, Virginia Department of Highways.

The four papers in this 118-page bulletin contain a total of 62 figures and nearly 350 bibliographic references. Available on request to Highway Board, 2101 Constitution Ave., Washington 25, D. C.

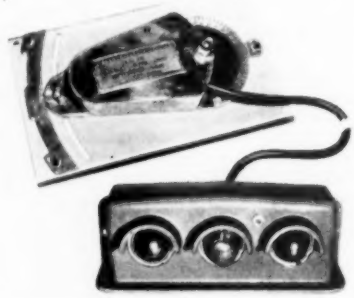
Baker-Lull Appointments. New appointments to executive posts have been announced by Baker-Lull Corporation, Minneapolis, Minn. Formerly the Lull Manufacturing Co., the firm was recently purchased by Baker-Raulang Co., Cleveland, O., and is a subsidiary of that organization. Dale McKee, chief engineer since 1951, has been elected vice president of engineering. William Norlander, formerly assistant chief engineer, succeeds Mr. McKee. Lloyd Pennington has been named assistant secretary, and Leonard Marnie has been appointed assistant treasurer. Other appointments include: William Delaney, service manager; David Hansen, national sales manager; Clarence J. Bornholat, factory manager.

WHAT'S NEW

in Equipment and Materials

Electronic Angle Measuring Instrument for Motor Graders

A new type of electronic angle measuring instrument for use on motor graders and other types of road building equipment has been introduced by the Electro-Level Corporation. Called Stewart's electric level, the device consists of two separate units—the protractor level head and the lighthouse. In operation the light panel instantly records any change in elevation through the blinking action of three bulls-eye lights, thus permitting the operator to make required adjustments instantly. The



Stewart Electric Level, Showing Protractor Level Head (Top) and Lighthouse (Bottom)

center light is green and the two end lights are yellow, for good visibility under day or night conditions.

The electric level is said to be extremely accurate. Tests on motor graders show that even unskilled operators can grade to within ⅛ in. accuracy with the use of this device, according to the manufacturer, who also states it is rust, oil, dust and moisture proof and can be safely operated under water. Both units are made of cast aluminum. They may be installed in various positions on the machine depending upon type of equipment and operating conditions. The level may be set to angles from 0 to 180°, or from 0 to 30% grade. The light panel operates on 6 to 12 volts.

For additional information circle Number 37 on inquiry card.

Jaeger Loaders Feature Torque Converter Drive

A line of "Load Plus" hydraulic tractor loaders has been announced by The Jaeger Machine Co. The 1 cu. yd. model is stated to combine a static load capacity of 5,000 lb. with ability to turn in a 14 ft. radius, hoist its bucket from ground to 8 ft. 2 in. dumping clearance in 9 seconds and travel at speeds to 18.7 mph. forward and 28.2 mph. in reverse. Torque converter drive automatically applies the power needed to enter material and fill bucket in one movement without shifting gears or need for impact loading. All load is centered on the large front driving wheels for maximum traction and balance. Instead of humping these wheels as it enters a pile, the rising bucket transmits a downward pressure on the 13:00 x 24 tires, increasing their tractive capacity. Rear axle steering, with power booster, makes possible the short

turning radius and unusual maneuverability, and also insures steering control when front wheels are in soft ground; 55 hp. gasoline or diesel engine, at rear, counterbalances the bucket load in front. Power is transmitted to the 5-speed transmission through a Fuller torque converter which eliminates all shock loads on the driving mechanism and automatically adjusts the

New Jaeger Tractor Loader

power to the load requirement, increasing speed with lighter loads and building up greater power to meet heavier loads. In addition to this 1 yd. model, tractor loaders in 12 cu. ft., ¾ cu. yd and 1½ cu. yd. models are available.

For additional information circle Number 51 on inquiry card.

Digging-Loader in Lower Price Range

A versatile new digging loader, known as the Terraload'r, accounted by American Tractor Corporation, is stated to have many features not usually found in industrial equipment in the lower price range. The Terraload'r can be used to load trucks and railroad gondolas. It digs trenches and grades as a bulldozer, and can carry loads from the site of one activity to another. A powerful hydraulic lift and control valve permits a float position for the efficient handling of loose materials when dozing

American Tractor Terraload'r

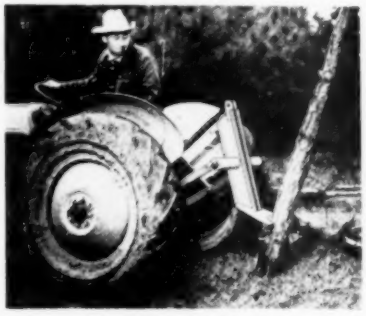
or loading. The close forward mounting allows unrestricted access to tractor seat and controls. Excellent operator visibility has been combined with full excavating width, ample dumping height and reach. It is claimed that the Terraload'r can doze efficiently without "roll under." The machine is available in three models: GT-30, GT-34, and DT-34. The first model has a drawbar horse power of 26.3, and is equipped with a ½ yd. bucket. The GT-34 has a drawbar power of 30 and the DT-34 (diesel), 29. The latter two models are equipped with a ⅝ yd. bucket.

For additional information circle Number 21 on inquiry card.

Tree Puller Combines Push and Lift

A new tree puller, the "Tree Grubber," announced by The Continental Manufacturing Co., will operate on any tractor with 3-point hydraulic implement hitch. The tractor, with Tree-Grubber attached, backs into a tree and pushes it horizontally. At the same time, the hydraulic lift is operated, which tends to lift the tree

vertically. This combination of horizontal push and vertical lift exerts sufficient diagonal force to push the tree out of the ground at about a 45 degree angle. Attached to small tractors, the manufacturer states that the Tree-Grubber will remove trees up to 6 in. in diameter. Trees are stated to be removed at the rate of about one a minute, depending on the condition of the ground. Tree-Grubber is made in two models—one with 3-point hookup for Ford, Ferguson, Case Eagle Hitch, John Deere 40, Massey Harris and similar tractors, the other for WD Allis-Chalmers. Weighing only 80 lb., it is easily attached and removed from the tractor.

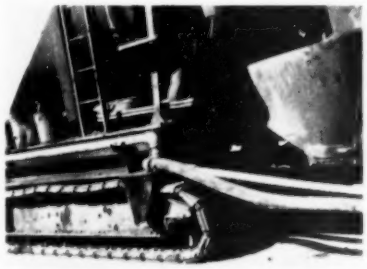


Tree Grubber

For additional information circle Number 8 on inquiry card.

Rubber-Lined Crawler Pads Speed Paving

A new process has been developed by Metalweld, Inc., whereby resilient rubber is vulcanized to steel plates and bolted to crawler pads. This permits movement of pavers over finished concrete without damaging the surface. The use of the rubber pads eliminates the expense of labor necessary to continually re-lay belting and also enables the contractor to progress faster with paving operations. Metalweld uses the B. F. Goodrich Volcalock bonding process which joins rubber and steel together with a bond strength of over 500 psi.



Paver with Rubber-lined Crawler Pads

For additional information circle Number 14 on inquiry card.

Cathodic Protection for Rust By Brush Applications

"Formula No. 50," a new method of surface protection of iron and steel has been developed by the Constad Laboratories. The recently developed product is described as offering the advantages of "Hot Dip" galvanizing without the costly, time consuming need for dismantling and with an important savings of transportation costs to and from the "Hot Dip" plant. Applied easily with a paint brush or spray gun (50-90 lb. psi. with a Number 4 nozzle) Constad's formula No. 50 is stated to take only one hour to dry. At

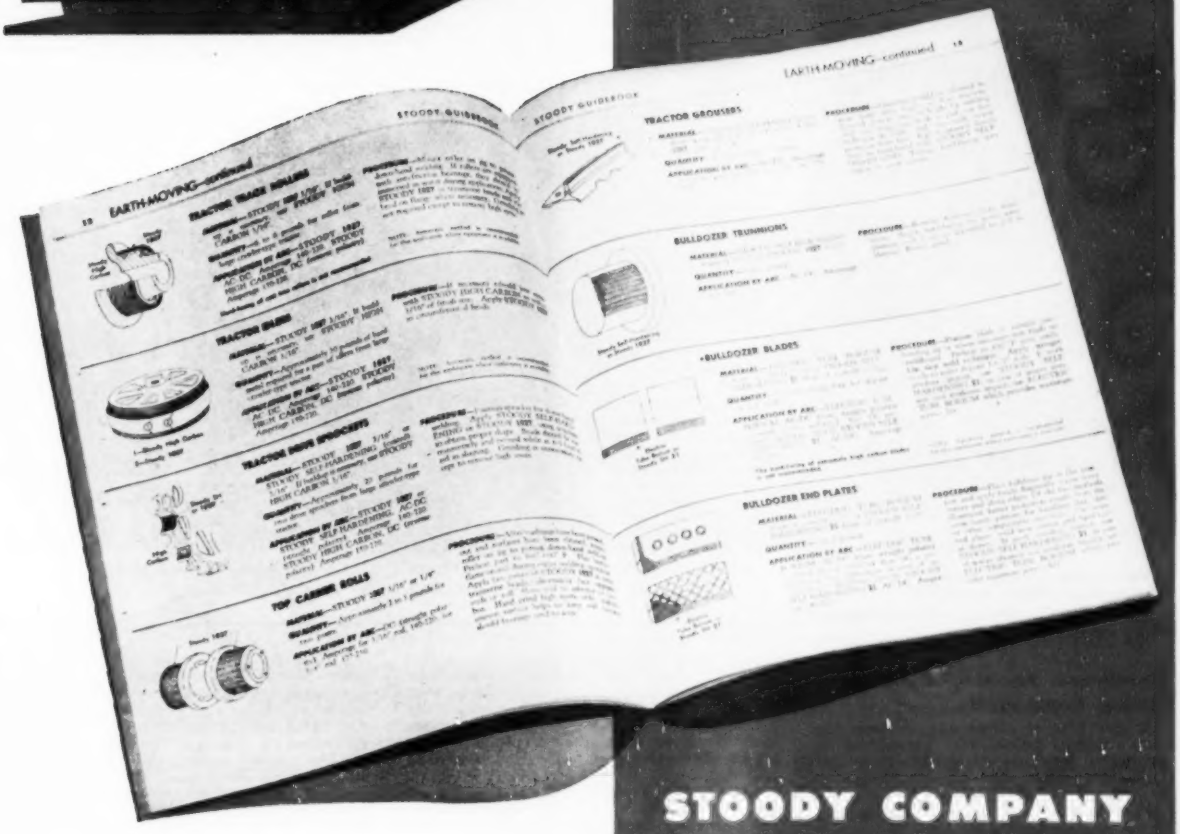
Your CAT-INTERNATIONAL or AC deserves the best!

Protect it with Stoody Hard-Facing!

Good as they are, these famous crawlers do need occasional rebuilding to keep them on the job.

While your tractors *are* down for maintenance, give them the best! Stoody Hard-Facing Alloys repay by making every worn part deliver additional hours of useful service, saving you money.

The newly revised Stoody GUIDE-BOOK illustrated here gives tried-and-proven facts on tractor maintenance... *names the best Stoody Alloy for each worn part... The exact procedure for hard-facing.* The book is yours at no charge—just write for your copy!



STOODY COMPANY

11925 EAST SLAUSON AVENUE, WHITTIER, CALIF.

brushing consistency it is stated to leave a deposit of .25 ounces per square foot; of a thickness of only .005 to .007 in. One gallon will cover 500 sq. ft. The product is stated to differ basically from other types of metallic paints in that it can be used over rusted surfaces (loose scale removed) and that a galvanic action takes place through the rust, which is probably reduced to metallic iron (magnetite). The "formula No. 50" produces electrical continuity between the steel and the coating, thus preventing "Rust Creep," states the manufacturer.

For additional information circle Number 13 on inquiry card.

Offset Boom Attachment For Gradall

An offset boom attachment, now offered as a standard accessory for Gradall, multi-purpose earth mover and construction machine of the Warner & Swasey Co., is designed to permit straight-line operations when trench centerlines are offset from the machine. The accessory is available in either 3 or 4-ft. sizes. Its use is claimed to be advantageous in work beside a roadway, as shown in the illustration, or whenever the work-line lies very close to trees or other obstacles which would prevent straddle-digging. The attachment is readily made to the machine, merely by clamping the shaft in the usual boom hinges and bolting the two top straps to the boom. The main boom tool-actuating cylinder may be transferred to the offset, or an integrally-mounted cylinder may be obtained with the accessory requiring only the transfer of hose connections. Tool mounting on the offset boom is the same as on the main boom, requiring only a few minutes to change to any one of a wide variety of standard buckets and tools.

Gradall with Offset Boom Attachment

For additional information circle Number 25 on inquiry card.

Membrane Forming Concrete Curing Compounds

A new line of membrane forming concrete curing compounds, announced by Servicised Products Corporation, includes pigmented (white and gray), clear, black and separation types, designed to meet the particular specification for each individual type. The new compounds are said to provide a fast, low cost method of controlled concrete curing by producing a vapor-tight membrane covering for freshly finished or stripped concrete, thereby insuring adequate water retention in the concrete as it sets up. When sprayed or painted on vertical surfaces, Servicised curing compounds are stated to "stay put"—will not run, leaving bare uncovered areas. This static quality, called "Thixotropy," is obtained by use of a false body, which looks and feels like liquid and causes the curing compound to change from liquid form to a gel when applied as a film on concrete surfaces. Designed to be applied by power or hand sprayer, the curing compounds are available in 55 gal. drums.

For additional information circle Number 5 on inquiry card.

Variable Power Eyepiece For Gurley Levels

A variable power eyepiece, which eliminates the need for more than one eyepiece for changes of magnification, is now a feature of Gurley levels, manufactured by W. & L. E. Gurley. The Gurley VP Eyepiece permits changes from high to low magnification, and back again, with stops anywhere in between; and gives a clear, flat field, devoid of aberrations, at any magnification selected. The eyepiece offers all the power required for the longest sight and reduced power to suit local conditions. Visibility under poor lighting can be improved by use of lower magnification; and the turbulent effect of heat waves, rising through the line of sight, is minimized with the lower power. Two eyepiece caps are supplied with the Gurley Variable Power Eyepiece. One of these incorporates a haze filter, useful for making long sights under adverse conditions.

For additional information circle Number 23 on inquiry card.

New Rubber-Tired Tractor Bulldozer Delivered to U.S. Corps of Engineers by Allis-Chalmers

51,300 Lb. 22 Ft. 9 In. Long Wheel Tractor Built for Army

A new massive tractor bulldozer has been delivered to the U. S. Corps of Engineers by Allis-Chalmers from its Cedar Rapids, Ia., works. This 4-wheel rubber-tired tractor, designed for operating scraper equipment and as a prime mover, was built for military use under a development contract with the Engineer Research and Development Laboratory, Fort Belvoir, Va.

Engineering on the vehicle started in January, 1951, under the direction of H. W. Rockwell, chief engineer; Dale Hawk, propect engineer; and Robert Johnson, winterization engineer. Construction of the "Bull Moose," as it is called, was started in March, 1952, and completed in November. Since then it has been undergoing various tests.

The vehicle is 11 ft. 7½ in. high; 22 ft. 9 in. long; and weighs 51,300 lb. with the dozer and cable control unit. The dozer blade itself is 11 ft. wide and 4 ft. high. The relatively low center of gravity and tremendous size gives the machine unusual stability.

Since speed and maneuverability are essential, the unit has been designed to travel at a top speed of 25 miles an hour pulling a 65,000 lb. towed load. The drive mechanism is of the 4-wheel type—front and rear wheels on each side are geared together. Maneuverability is achieved through 4-wheel hydraulic power steering which permits control of both sets of front and rear wheels simultaneously or independently. Thus all four wheels could be turned simultaneously to the same angle if desired and the unit then would move sideways at that angle. The tractor can also be steered by braking. Power is provided by a Cummins diesel engine. A torque converter and semi-automatic transmission are additional features of the drive mechanism.

Another interesting aspect of the "Bull Moose" is the design problem presented by the temperature requirements. To meet operating conditions of 65 degrees below zero, the tractor has enough heaters underneath the engine hood to heat three 5-room houses (in a moderate climate like southern Illinois, for example). For operator comfort, a heater is installed inside the cab. It would heat an average 4-room house. The engine heaters are designed to enable the tractor to start within an hour in a temperature of 65 degrees below zero. Coolant used in the engine tests to 90 degrees below zero. One of the safety features built into the tractor is escape hatches in the top of the cab. If the tractor turned on its side or fell through weak ice, the operator could crawl out of the cab.

For additional information circle Number 27 on inquiry card.

You pick the job!

WHAT'S the toughest blading operation you've got? Ditching? Bank-sloping? If you want to see it done better, easier, with more work output per hour, watch a Cat* Motor Grader handle it.

Watch the operator change through the full range of blade positions in one minute without leaving his seat! Get into the seat yourself! Notice how the operator has a full view of his work without standing up. Check the steady production with no stops for adjustment.

Your Caterpillar Dealer is ready to demonstrate any of the three models—No. 212, No. 112, or No. 12. Fair enough? Call him today.

Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

New Abrasive Blades for Cutting Masonry Materials

New abrasive blades that cut masonry materials with speeds approaching those of diamond blades have been perfected by Clipper Manufacturing Co. It is stated these new abrasive blades will slice through a 2 in. x 5 in. Natco furing tile in only 11 seconds, through first quality dry press fire brick in 5 seconds, face brick in 8 seconds, concrete block in 17 seconds.

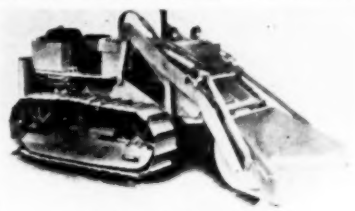
Clipper Masonry Saw with Abrasive Blade

These new, wet cutting blades have been thoroughly tested by Clipper engineers at speeds far in excess of standard operating speeds to provide a greater margin of safety. Other features include: Factory dressed cutting edge that assures peak cutting efficiency from the moment the blade first touches the material; protective blade blotters that lessen the possibility of fracturing from over-tightening the blade collar; steel blade centers that guard the saw shaft and strengthen the blade.

For additional information circle Number 61 on inquiry card.

New Front End Loaders Feature New Development

Two new 4-wheel planetary drive, 4-wheel power steering front end loaders, the Scoopmobile Models LD5 and LD10, have been announced by Mixermobile Manufacturers. The LD5 capacity is ¾ to 1 cu. yd.; LD10 capacity, 1⅝ to 2 cu. yd. Featuring an entirely new development in smooth, flexible power, these Scoopmobiles employ a new principle of construction by hinging two power axle elements



Model LD5 Scoopmobile

together with an oscillating center-pin steering coupling. This coupling allows an oscillating twist to the axles, retaining full power on all 4 wheels in any degree of the turning radius. Power from engine is transmitted to all 4 wheels through 3-to-1 planetary gearing, producing positive traction and tremendous "dig in" power. Hydraulically operated loading bucket has exceptional "break out" action resulting in better and faster loading. Hinged coupling steering allows excellent lateral spotting of bucket. Discharge height—LD5, 8 ft. 6 in.; LD10, 9 ft. Reversing transmission has 8 speeds forward and back. Diesel power optional at extra cost.

For additional information circle Number 60 on inquiry card.

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No Postage Stamp Necessary If Mailed in the United States

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ROADS AND STREETS

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ROADS AND STREETS

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CHICAGO 10, ILLINOIS

My Name _____ My Title _____

My Firm or Govt. Dept. _____

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Send me information about products advertised on:

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Page ____ by _____ Page ____ by _____

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Send me more new equipment information on items circled:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
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6/53 R&S

Bituminous ROADS AND STREETS

Published by Gillette Publishing Company
53 West Jackson Street, Chicago 10, Illinois

Cover Scene

Patching work in progress on a Mississippi state highway. Heated bituminous patching materials being produced by a McCannaughey "Multi-Pug" mixer.

"Two Way" Plant Serves Los Angeles Asphalt Contractor

Emulsified Asphalt—Its Use in Base Course Stabilization

Latest Developments in Roadbuilding Equipment

JUNE, 1953

If ever a truck was designed with the driver in mind...

this new Ford Truck is it! New "DRIVERIZED" Cab cuts driver fatigue. New easy handling saves work and time getting around in tight spots. These and many other TIME-SAVING features in the all-new Ford Trucks help get jobs done fast.

Time is money! Today's truck owners know it. Ford Truck engineers know it. That's why TIME-SAVING was a major goal in designing the completely new Ford Trucks for 1953. With scores of new TIME-SAVING features, the new Ford Trucks are made-to-order for your work.

New "DRIVERIZED" Cabs provide living room comfort, cut driver fatigue. They help save time by making driving easier and more efficient in many ways:

Better visibility for instance. Although the new curved one-piece windshield is the most obvious improvement, bigger windows at the sides plus a 4-ft.-wide window at the rear, offer an amazing increase in all-around visibility.

The new Ford Truck seat is something special. Wider, of course. Non-sag seat springs. Adjustable seat cushion *and* separate adjustable back-rest. Most interesting new Ford exclusive feature is that every seat now has a built-in *shock snubber* to help level out the ride.

For easier maneuvering in tight quarters, or in loading and unloading, turning diameter has been considerably reduced. This was done by "setting back" the front axle, widening the front tread, and by improving the steering geometry.

NEW "DRIVERIZED" CABS cut driver fatigue. Both Standard and Deluxe Cab (shown) have new curved one-piece windshield, 55% bigger; new wider adjustable seat; new seat *shock snubber;* new push-button door handles.

New F-900 BIG JOB has G.V.W. rating of 27,000 lbs. for extra heavy hauling work. LOW FRICTION 155-h.p. *Cargo King V-8* offers high sustained torque to give you more performance flexibility for your heaviest loads.

Synchro-Silent type transmissions are now standard on all of the new truck models and at no extra cost. This means faster shifting without double clutching and less truck momentum lost.

New LOW-FRICTION design reduces piston travel, cuts down friction "power waste." You get more useable power...*on regular gas.* The 145-h.p. overhead-valve Cargo King V-8 has more power per cubic inch than any engine in its class. The 155-h.p. overhead-valve Cargo King V-8 is the most powerful Ford Truck engine ever built.

And only Ford gives you a choice of V-8 or Six in five different engines.

New Ford service accessibility saves time in the shop. Front ends have been redesigned. Hoods are wider. Frames are wider, too, permitting a new fender contour that makes engines much easier to get at.

Over 190 models in a greatly expanded line give you many more Ford Trucks to choose from in order to get the one *right* truck for *your* job.

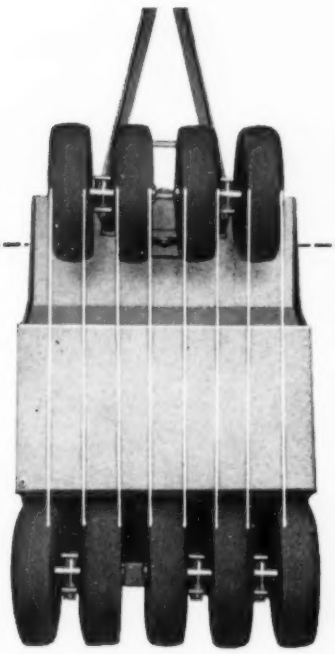
FOR COMPLETE INFORMATION on all or any of the new Ford Trucks, write: FORD Division of FORD MOTOR COMPANY, P.O. Box 658, Dearborn, Michigan. State your work and what type of truck interests you most.

Fifty Years Forward — *on the American Road*

FORD *ECONOMY* **TRUCKS**

SAVE TIME! SAVE MONEY! LAST LONGER!

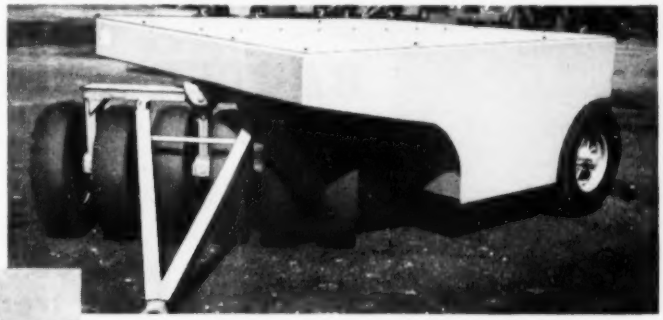
What's New in Compaction Equipment?



◀ NEW DEVELOPMENT BY BROS... EXTRA-WIDE TIRES NOW GIVE COMPLETE COVERAGE

Bros scoops the roller field! No more lines, ridges or marks when you work with new Bros Pneumatic Tire Rollers! New Bros wide-face tires give full compaction coverage in *one pass.* And you pay nothing extra — these new super-tires are now standard equipment on all three models, in both Straight-Wheel and Wobble-Wheel* designs. For any job from rough base compaction to seal coat rolling, you'll find a new Bros Roller does it faster and cheaper.

*Patented and copyrighted by Wm. Bros Boiler & Mfg. Co.



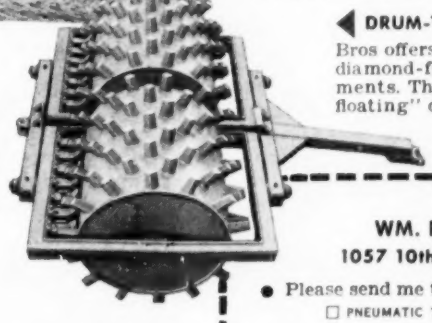
THREE MODELS — TWO DESIGNS ▶

Choose a 7, 9 or 13 ton maximum capacity model, and then vary working weights to suit your job. Bros Straight-Wheel design has wheels moving up and down on oscillating axles. Exclusive Wobble-Wheel* design adds a weaving, kneading motion to each wheel. Only Bros offers both.

◀ GIANT "SUPER LOAD" ROLL-O-PACTORS*

These Bros "big boys" were featured recently in an *Engineering News-Record* article describing proved advances in compaction equipment. Roll-O-Pactors* have been more widely approved on the big jobs than any other compactor. 35 and 50-ton models available — working weights from 20,000 to 100,000 lbs. Rubber is the trend in compaction — and Bros is *first* in tried and true equipment.

*ROLL-O-PACTOR patents: U.S.: 2,610,557; Canada: 487,945; Mexico: 52,368



◀ DRUM-TYPE TAMPERS

Bros offers a complete line of sheepfoot and diamond-foot tampers for special requirements. They're really rugged! New "full-floating" design eliminates strains, permits individual drum oscillation and makes handling easier.

If compaction work is in your next job, it will pay you to find out what a difference Bros equipment can make in your time schedule and your profit figures. See your nearest distributor and mail the coupon for new literature.

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World's Largest Manufacturer of Pneumatic Tire Rollers

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INTRODUCING

THE NEW

BARBER-GREENE MODEL 705-B

Runabout SERVICE DITCHER

Trademark registered at U. S. Patent Office

Now... greater efficiency for lowest cost per foot of trench than ever before!

Here is the new Barber-Greene Model 705-B Runabout . . . successor to the famous B-G service ditchers that have set the standards of performance in the ditching field. Three major 705-B design features are:

1. ***New Fluid Drive.*** **Eliminates shock loads. Requires no overload devices of any kind. Gives operator new control of applied power.**
2. ***New Curved, Reversible, Insert Digging Teeth.*** **Give 3 to 5 times longer tooth life.**
3. ***New Automatic Counterbalance Valve.*** **Automatically maintains constant crowding speed when digging down grade.**

These, plus other design advancements, are in addition to proven Runabout advantages such as the exclusive Hydra-Crowd with its infinite range of crowding speeds, independent of bucket-line speeds; control from ground or cab; instant crowding, stop and reverse; fast road travel; vertical boom, ready to dig on arrival, leaves no ramp; special differential for better traction on slippery surfaces; hydraulic hoist for finger-tip operation of boom.

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Barber-Greene

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VIEWS AND COMMENTS

By H. G. Nevitt

Rules Are Not Enough

A paper delivered at the last annual meeting of the Association of Asphalt Paving Technologists, Houston, January 26, 1953, and the comments following, made some fundamental points worth attention from everyone engaged in bituminous work.

The paper was a discussion of the method—primarily the design criteria—developed by the U.S. Engineers for asphalt pavement design. The author, W. H. Campen of Omaha, states that these rules may result in an apparently usable mix but frequently give one that is not the best possible. He also pointed out that they cannot logically apply to all possible (and practicable) gradations of aggregate. And in the discussion he further commented that the designer must strive to end up with certain mix characteristics not definable by rule. These characteristics are essentially that the mix must be tough and stable yet also plastic in nature. This last point is very important. Bituminous mixes owe their success to the fact that they make flexible pavements. To do so they must have certain characteristics. It is questionable whether any present test technique provides a real measure of this ability to carry load yet still retain flexibility or plasticity.

It is only fair to point out the background of the army method, involving the Marshall test. A pressing need in the last war was for some method of building a vast number of roads and airports with personnel quite inexperienced in the specialized technique of asphalt construction. For such circumstances the quickly applied Marshall test, with equipment suited to field testing, was the best available answer. In fact, it probably still is. It may not produce the best job if blindly applied, but it offers high assurance of giving a usable surface. We do not think its or perhaps any rules of design can be substituted for the understanding and judgment of the competent bituminous engineer. But we do think the Vicksburg laboratory deserves the greatest of credit for the development.

Incidentally, the flow reading in the Marshall test is probably the nearest approach to a measure of flexibility yet proposed. It is not, in our opinion, the complete answer, but it does try to meet the need and point the way. Any challenge to the method must be in its application to peacetime or noncombat conditions. In this area of use we think Mr. Campen's indictment must be given serious consideration.

Results or Test OK

The criticisms made have universal application. They sum up to the statement that we must obtain a certain type of structure rather than merely meet some test requirements. Every experienced engineer has sometime found himself laying mixes which were obviously unsatisfactory. They were too harsh, brittle, or perhaps pushy; or obviously without sufficient bond; or appeared to have some other visible defect. Obviously, even though they met some official requirements they were not satisfactory.

This does not mean that he should change the design, but he should certainly challenge it. For designing in the field—that is, without benefit of a system of tests—is a dangerous procedure. It is almost invariably less reliable than any laboratory method. Take the question of asphalt content, for example. It is almost impossible to decide its correctness by eye. The color, wetness, or other detectible characteristics are too dependent upon factors which are not involved in the proper asphalt amount.

So we must have a design technique, presumably based on laboratory procedures or their equivalent. But at the same time the finished mix, after setting and compaction, must meet certain needs, and the experienced eye can often tell that these requirements are not present.

We will not have the best possible results until this situation is brought into the design picture.

Are We Making the Most of Our Blessings?

We doubt there will be great disagreement with the preceding theme, that a bituminous surface should have certain physical characteristics regardless of specifications or arbitrary laboratory tests. But it brings up another point, on which we have no final opinion but believe of sufficient interest to warrant discussion.

In certain areas of this country hard, durable aggregate seems to predominate, either due to natural availability or the prevalence of commercial plants producing material of this type. With it strong, long lasting surfaces can be built with little effort or attention to design and construction details. The natural high strength and bitumen tolerance of such aggregate eliminates many of the problems encountered elsewhere. And when care is taken to provide closely controlled gradations and other conventional design features the result is a surface of extremely high stability. Where the soil conditions are likewise favorable, as is frequently the case, fine appearing roads can be built with an ease which is the envy of engineers elsewhere. These less fortunate individuals are usually confronted with round or soft aggregate, along with unbalanced gradations and insufficient large sized material to entirely get the help needed through crushing.

Best Engineering?

We certainly do not wish to disturb the idyllic picture presented by these favored areas. Nevertheless, we have some nagging doubts. Admitting the fine appearance and record of these roads, do they still represent the best engineering—particularly from the standpoint of economics? Would a surface of less stability, presumably involving less care and expense, have better utilized the basic advantage of the flexible type?

We suspect that many of these very high stability surfaces are essentially

(Continued on page 98)

★ In this panoramic view of the Daley Corporation plant, the entire asphalt mixing cycle is illustrated. At the extreme right, the aggregate material is brought to the plant by belt conveyor and discharged into the dryer. Note that any oversize, rejected by the dryer's screen is exhausted into a hopper for reclaiming. Passing through the gradation control unit (left of tall stack), the heated and dried aggregate is sized and fed into the mixer, which is obscured by the gradation unit

Daley's "Two-Way" Plant

Supplies Hot Asphaltic or Cement-Stabilization Mix

This high-output plant can operate on over-the-road job assignments, as well as at its fixed site; is designed to produce either hot-mix asphaltic concrete or sand-clay-cement stabilized base mix with quick change-over.

"HOT AC bituminous mix? Yessir, we're mixing it all morning. Capacity? Oh, upwards of 200 tons per hour. Stabilized base mix? Yessir, we'll be mixing that all afternoon. Capacity? Oh, upwards of 300 tons per hour. Both plants? No sir, we're just using our one plant."

That could be one end of a telephone conversation almost any day of the week at the plant of the Daley Corporation at San Diego, California. Like a lady of fashion switching hair styles, the Daley plant changes back and forth from a wide variety of hot and cold bituminous plant mix to stabilized base material with a degree of frequency dictated only by the demand for their varied products.

The Daley Corporation has been one of Southern California's leading contractors for thirty years or more. Their activities reach back to the days of mule-powered graders.

With a very special program in mind, they purchased a new asphalt plant in 1951. This plant, a Barber-Greene Model 848, is normally rated at from 80 to 120 tons per hour and consisted of a Model 848 heavy-duty mixer, a Model 837 dryer, a Model 866 gradation control unit with a special 4 x 14 Simmons 3-deck vibrating screen, a Model 857 dust collector and accessory feeders, elevators, etc.

Although the Daley firm contemplated doing most of their mixing at a single location, it demanded, and received, a completely portable plant in which every major component was rubber-tire-mounted and capable of being towed by a truck. With this portability, they would always be able to move their set-up out to a job if the situation required it.

With only 3% to 4% moisture to contend with, under most operating circumstances, Daley conferred with manufacturer's engineers and their West Coast representatives, Brown-Bevis-Industrial Equipment Co. of Los Angeles, and found that by using two standard Barber-Greene steam atomized oil burners, instead of one, in the dryer, they could set up production to approximately 200 tons per hour. The mixer and other plant components are easily capable of handling this heavy tonnage. The normal plant rating of 80 to 120 tons per hour is computed on the basis of a much higher moisture content in the aggregate, generally.

To provide the necessary steam pressure, a 175-hp. boiler was obtained. This also provides the necessary heat for the asphalt tanks, the mixer storage tank and pugmill, and for the steam jacketing on the asphalt lines.

Other Adaptation

Having stepped up the plant capacity they set about to effect other additions and alterations which would fit the standard plant to the exact requirements of their special set-up.

To eliminate waste of material and to facilitate plant housekeeping, the oversize which is rejected by the grizzly screen on the dryer and by the screens on the gradation control unit, is borne by belt conveyors to two truck loading hoppers. The overflow from the gradation unit's four bins is also directed into one of

these hoppers. At intervals, a truck is loaded from the hoppers and returns the material to the stockpile, or to the crusher for reprocessing.

One of the most salient additions to the standard mixer was the addition of a belt conveyor from the mixer pugmill discharge gate to a truck loading bin. This bin holds from 15 to 20 tons. Below this is a weigh-batch hopper of 15 ton capacity. An attendant is thus able to place any exact amount from 1 to 15 tons of material in a truck without resorting to a pit scale. He controls the discharge by a simple air-ram valve which, in turn, fills the 15 ton hopper from the larger one, then discharges into the waiting truck.

Several advantages have accrued from this arrangement. The mixer can be operated at full capacity, without shutdown, even if several minutes elapse between trucks. The controlled weigh-batching of loads removes the danger of running afoul of California's stringent highway overloading laws and at the same time keeps trucks from travelling light-loaded.

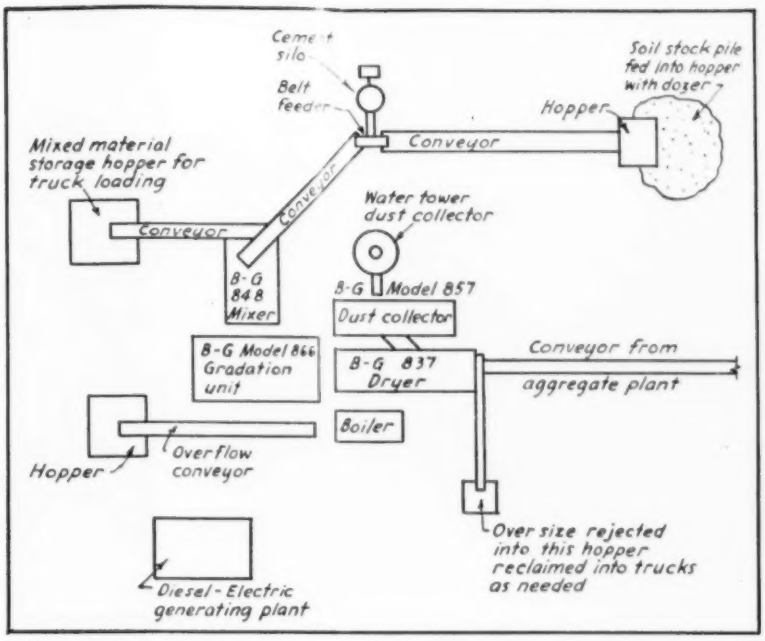
The conveyor from the mixer to the hopper is made up of Barber-Greene's standardized conveyor components and is equipped with a special oil-resistant hot material belt. Adherence of the asphaltic mix is minimized by placing a light but continuous spray of oil on the belt just before the point where it received the discharge from the pugmill.

The hopper just described was designed and built by the Daley Corporation.

Water-Fog Dust Collector

Another plant refinement was the addition of a water-fog type dust collector. The standard dust collector adequately performs the usual collection function, reclaiming fine material for re-use in the mix and minimizing the dust present in the air around the plant. However, because of their location in an urban area, the Daley people were desirous of removing dust from their exhaust air to the highest degree possible, by the accepted practice of adding a water-type collector. The hot exhaust air from the dust collector is piped into a vertical cylinder some 10 feet in diameter. As it is projected upwards, it is bombarded from three rows of nozzles, giving off a high pressure fog-spray of water. This fog precipitates the remaining dust particles to a sludge pit which, in turn, discharges through a steeply pitched 10 inch pipe into the nearby San Diego River. The air and steam thus generated are exhausted through a vertical stack.

Two other plant additions are worthy of mention. One is a complete 125-kw. electric plant, powered by a Caterpillar D-17000 diesel generator which provides power for the conveyor motors and other plant accessories. Standard diesel power units drive the mixer, the dryer, dust collector and gradation units of the



★ How Daley's plant is laid out

plant. The second installation is a water softening plant which provides impurity-free water for the boiler's feed-water system.

Even the asphalt plant's physical location was carefully thought out.

For many years prior to their purchase of the plant, Daley had produced their mix in a 3000-lb. capacity weigh-batch plant. Aggregate for this plant was brought from the company's rock pit, some 4 miles distant. The rock was inter-mixed with clay and soil. After the rock, which ranges up to 10 inches in diameter, had been scalped from the soil, it was hauled to the crushing plant where it was processed in a 15 x 38 Pacific jaw primary crusher, a 3 ft. and a 4 ft. Symons shorthead cone secondary crusher, and sized over a 4 ft. x 12 ft. Symons vibrating screen. Each size then goes to the stock piles by separate belt conveyors. The crushing plant was of Daley company design.

Duplicate Tunnel

The weigh-batch asphalt plant was fed by a tunnel conveyor, running beneath the piles of various sizes of rock and sand. When the Barber-Green plant took over the primary asphalt mixing duties, this tunnel and conveyor system was duplicated to serve it. Sand for asphalt production is available nearby in the river bed and is hauled to the plant in scrapers.

When production requirements are extraordinarily high, the old batch plant is still operated, in addition to the new plant, to achieve the extra tonnage needed.

When the plant is set up to produce asphaltic cement mixes, the aggregate is roughly proportioned by belt feeders and borne to the dryer over the B-G belt conveyor. In the dryer, the moisture content is reduced to the limits prescribed by the specifications being followed; and the aggregate, dried and heated, is delivered to the gradation control unit by an enclosed bucket elevator.

In the gradation control unit, the aggregate is screened and separated into as many as four different sizes. Each of the different sizes is stored in a separate bin, at the bottom of which is a calibrated gate. The common floor of each bin is an apron feeder. The proper proportions for each size of aggregate are controlled by varying the gate settings. Once these settings have been established, the gates are locked and the proportions remain constant all during the mixing period.

The gradation control unit feeder is powered by the mixer. This mechanical interlock maintains a constant proportion between the separate sizes and total bulk of aggregate and the asphalt supplied by the pump. The ratio remains constant until reset.

In the mixer, the aggregate and bitumen are combined and mixed in a twin-shaft pugmill. The paddle arms on the twin shafts can be set to speed up or retard the mix, thus assisting in controlling the duration of the mixing cycle.

From the pugmill, the mixed aggregate and the bitumen are conveyed to the truck loading hopper as previously described.

Stabilized Base Material

Stabilized base material has become a big thing in California construction in recent years. To meet the ever-increasing demand for this product, the Daley Corporation, in the

★ At the opposite end of the mixing plant is the stabilization set-up. The mixture of clay, sand and stone is carried by belt from the stockpile at the extreme left. Discharged into the hopper (center) it is proportioned over a belt feeder and combined with the proper proportion of cement from the tower at the right. The ingredients are then carried by another conveyor to the mixer hopper (center rear). Stabilized material, like the asphaltic mix, is conveyed to the truck loading hopper which is partially visible at the left of the cement tower elevator

Fall of 1952, decided upon still further additions to their Barber-Greene plant.

A stockpile and hopper are provided to contain a supply of the clay-sand mixture as it is brought from the river bed or other sources. A short channel-frame belt conveyor, built by Daley, carries the material to a grizzly screen where stones, oversize clods, debris etc., are scalped out. Actually, only a very small percentage of this material is encountered.

To facilitate accurate proportioning, the screened material falls into a hopper which is equipped with a calibrated gate. Beneath this hopper is a belt feeder which carries the clay-sand mixture out through the gate in a constant and easily established rate of flow.

Bulk cement is stored in a vertical silo made by the Noble Co. of Oakland, California. Depending upon the nature of the job, between 2 and 6 per cent by volume of cement is added to the aggregate which is a composition of clay, fine and coarse sand, pea gravel and a small amount of 1-in.-minus rock.

The proper proportion of cement is added by means of a Barber-Greene Model 811-A fines feeder. This unit consists of a hopper and a tube-enclosed screw conveyor. It is interlocked with the apron feeder mentioned above so that a constant proportion is maintained throughout operation.

After the elements have been combined, both are carried by a conveyor and discharged into the hopper of the asphalt mixer. Here, again, the combined ingredients are carefully and accurately proportioned, this time, however, as a combined bulk. The mixer feeder is interlocked, mechanically, with a water pump which adds the right percentage of moisture to the mix. The stabilized material is then thoroughly mixed in the same twin-shaft mixing pugmill, employed for the asphalt mixing.

To prevent contamination of either the asphalt or stabilized mix, a batch of dry, clean aggregate is run through the mixer whenever a change is made from one product to another. The stabilized mix is loaded through the same hopper used to store and load the asphalt mix. The clean-out procedure described for the mixer also applies to this hopper.

The principals of the Daley Corporation are George R. Daley, President; Don Daley, Vice President and General Manager, and W. W. Davis, Secretary.

Views and Comments

(Continued from page 95)

rigid pavements. Given sufficient thickness to bridge over settlement variations and edge weakness, and soil conditions which avoid pumping, rigid surfacing is an excellent type. Cracking presents problems, but they can usually be handled. But the basic advantage of the flexible type, that it more fully utilizes the bearing power of the soil over the entire area, and hence can usually be built more cheaply, has given it the greatest mileage. So we have two questions.

(1) Do these high stability pavements, despite their use of a binder which permits flexibility, sacrifice some of the merits inherent in the flexible type?

(2) Is it possible to build cheaper surfaces (through less thickness, more economical gradations, or other features) and get the same result?

Note that the answers to the two questions are not necessarily related.

That increased stability does not necessarily mean a better mix is not a new thought. Many years ago Vokac, in a review of failures on existing pavements, demonstrated that too much stability (as measured by the tests used) seemed to be nearly as undesirable as too little. We do not recall that his studies differentiated between high stability due to aggregate type and that resulting from insufficient bitumen. Engineers are now in agreement that lean mixes or excessive filler do not give good surfaces despite the high stability value they may bring about. Is the same true for high values due to angular aggregate combined with tight gradations?

Engineers do not willingly sacrifice apparent high strength or other benefits without reason. These reasons may include the fact that present stability tests do not exactly measure structural capacity in the road. Or that high stability may be accompanied by brittleness—which is really a basis for the preceding statement. For example, binders showing higher strength with no loss of flexibility would undoubtedly be an improvement. But if the apparent advantages, or use of such binder without attention to this matter of flexibility, resulted in surfaces which gave up either the structural benefits of the flexible type or the economics inherent in bituminous construction for this or other reasons, the construction might not meet the primary engineering need of providing the most for the money.

Whatever the true situation here, we think it illustrates a basic point we make at every opportunity. This is that for low cost roads we must have high type engineering. Every advantage must be scanned for possible exploitation rather than complacently accepted. And the benefits inherent in bituminous construction carry with them the implied demand that they be utilized to the utmost.

In the great majority of cases the best bituminous engineering is not evidenced alone by the fine appearance of the structure but instead the economy by which a suitable and enduring one was obtained.

Euclid 15.5 cu. yd. Scraper hauls load out of wet, spongy borrow pit near East Pembroke.

Bottom-Dump "Euc" receives a heaping payload of 15 cu. yds. from a Euclid Loader in 40 seconds near Montezuma, N. Y.

"Eucs"

SPEED GRADING ON NEW YORK THRUWAY

Working near Schenectady, this "Euc" is dumping 15 tons of fill material.

Contractors working on the New York State Thruway depend on Euclids to get the job done on schedule. There are already about 135 "Eucs" on this 535-mile project, which requires the moving of approximately 80,000,000 cu. yds. of earth and rock. The Thruway is scheduled for completion in 1954.

All types of Euclid equipment—Scrapers, Bottom-Dumps, Rear-Dumps and Loaders—are speeding the grading on this job... hauling bigger loads, faster, and at low cost... providing dependable service at low maintenance cost under the toughest conditions.

Here, as on the building of many highways, dams, airports, levees, and other major earth moving jobs, you'll find the large capacity, high speed and job availability of "Eucs" paying off for owners.

The EUCLID ROAD MACHINERY Co.
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FOR MOVING EARTH, ROCK, COAL AND ORE

Use of Emulsified Asphalt

IN BASE COURSE MATERIALS

Principles involved in stabilizing sandy, "borderline" and fine-grained soils are discussed by this author, together with some of the difficulties with fine-grained soils and the need for more data on treating them.

By D. E. Stevens
Resarch Engineer
American Bituminous & Asphalt Company

THERE are two primary aspects of the use of emulsified asphalt in the treatment of base course materials which are of greatest interest to the paving technologist. Asphalt has a marked ability to provide cohesion to many materials, and it has a definite tendency to slow down the rate of moisture transfer in a structure into which it has been incorporated.

All of our interest in emulsified asphalt in this field is based on these two properties, and the net success or failure of a project will depend upon whether or not these two properties cover the major negative influences tending toward base failure. The purpose of this paper is to analyze the types of materials and the major environmental factors which are satisfactorily handled by these properties.

Sandy materials treated with emulsified asphalt have resulted in some of the most fool-proof and highly successful base course jobs known to the road building profession. Mixing is easy, dehydration is a relatively simple problem, stability is excellent with most sands, and the sand mix will bear traffic satisfactorily during dehydration before final surfacing.

Border-Line Materials

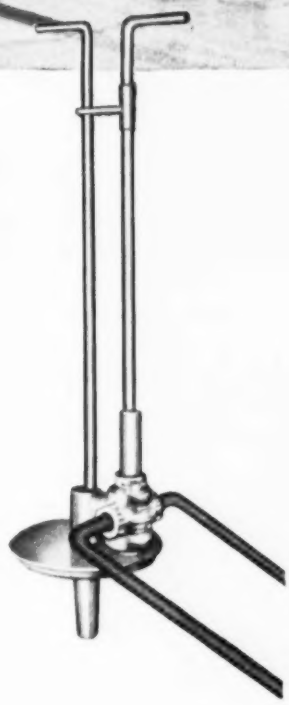
While sandy materials offer the best proven field for use of emulsified asphalt in base course treatment, increasing interest is being noted in their use in the treating of border-line pit-run aggregates. Many areas of the country are essential without good granular base materials, and others are rapidly exhausting the readily available sources. As a consequence, one is faced with the discouraging fact that whereas the demands placed on a road structure by modern traffic are becoming increasingly severe, the materials available to be put into that road structure are declining rapidly in quality.

Ways and means of improving the use of available sources of base materials must therefore be found. Emulsified asphalt has been shown on an increasing number of successful jobs to be ideally suited to improvement of border-line aggregates. To date, there is no great body of knowledge available on this subject. Possible mechanisms by which the emulsified asphalt assists in maintaining stability properties of these materials will be discussed.

The field of use in which emulsified asphalt has been shown by experience

Prepared for presentation at Committee Meeting on Emulsified Asphalt Soil Stabilization, American Road Builders Association annual meeting, Boston, February 9-11, 1953.

NEW ETNYRE UNDERSEAL GUN



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Sunken sub-base under concrete pavement is getting the full treatment these days, when an Etnyre "Black Topper" is used to pump bituminous material through a new Underseal Gun. The gun is designed specifically for this work. Long handles keep the operator in a comfortable position. A shield at the base protects the operator from squirting of hot material. The tapered gun fits snugly into the pavement opening. And the packed valve eases operation as it protects against leakage. Material flows constantly through both hoses, even when pumping under the pavement. As a result the material never "sets-up" in either hose. Get complete details and prices—ask about Underseal Gun No. US-1A.

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to be most problematical is in conjunction with highly cohesive soils. Present research on clays is showing that this is a vast and complex materials field; and in adding the complexity of the various environmental conditions in which the treated bases are finally used, one can visualize the difficulties with which this field of use is beset.

With Cohesive Soils

There have been a large number of jobs completed in the past twenty years in which emulsified asphalt stabilized cohesive soils have provided excellent base courses. There have also been a number of failures in this same class of construction and under circumstances which cannot be explained in view of the parallel successes. The use of asphalt with highly cohesive soils, therefore, presents a definite gamble at this time which cannot be minimized by any known techniques of testing or handling.

Before discussing the mechanics by which an asphalt emulsion acts on these various categories of material, it would be desirable to eliminate any possible confusion by a definition of the various types of materials being discussed. In general, a sand is considered as being fine-grained, with virtually everything passing a No. 8 sieve, and little passing a No. 200 sieve. Materials are also usually considered sandy, even when large percentages pass the No. 200 sieve provided that these fines are non-plastic. Most authorities regard a plastic index of four as being an upper limit for sands.

Pit-run materials are characterized by the large proportion of coarse aggregate which they contain. Usually, there is insufficient fine aggregate and dust to fill the interstices with the consequence that bearing is primarily coarse rock on coarse rock. Naturally-occurring fines in pit-run aggregate may or may not be plastic. They are most troublesome in the former case and require some type of treatment for use on heavy-duty roads.

Cohesive soils typically consist of large proportions of colloidal fines which have a marked tendency to absorb moisture. Any small proportion of coarse aggregate is lost in the fine-grained matrix so that bearing is accomplished only on the fine-grained material. It has often been proposed that cohesive soils be considered as those materials having a plastic index greater than four.

Mechanics of Stabilization

To proceed now with the mechanism of stabilization, there appear to be perfectly good reasons why asphalts perform consistently well in the two fields of sand and pit-run aggregates and unpredictably in cohesive soils. In sands, it is cohesion that is needed to provide stability under load. A large proportion of sands possess excellent internal friction qualities so

that they have excellent load bearing qualities when confined. On the other hand, if not confined they will push vertically up around the load bearing area because of lack of cohesion.

This can readily be seen at the seashore. If one walks on the dry sand beyond the reaches of the waves, the sand pushes aside and up underfoot. However, as soon as the sand is slightly dampened by the sea water, one may readily walk on it. Moisture provides just that small amount of cohesion required to produce stability under load.

Inasmuch as asphalt has much greater cohesive strength than does water, it offers an ideal means of supplying the necessary cohesive strength to a sand. This it accomplishes by coating the individual sand grains, causing them to cohere to one another. Asphalt accomplishes this without it being necessary to fill the large volume of voids present in most sands, whereas cementitious materials which set by hydration must largely fill the voids space before satisfactory cohesion is attained.

Further, inasmuch as it is cohesion which is needed in a sand, even the water carrier in emulsified asphalt contributes cohesive strength to the system. For this reason, the drying out of a treated sand is much less critical than for a treated cohesive soil.

More Facts Needed

The treating of border-line pit-run aggregates also offers an ideal field for use of emulsified asphalt as discussed above. However, not as much is known in this area of endeavor concerning the mechanics by which stabilization occurs. Although normally there are insufficient fines for the fines portion to become the load-bearing medium, nevertheless, a small amount of cohesive material, apparently, can result in serious failures under heavy traffic.

It seems probable that what occurs in such instances is that the cohesive fraction when saturated acts as a lubricant for the coarse aggregate. Essentially then, the internal friction of the coarse aggregate is lessened and its net load bearing strength lowered. By adding a small percentage of emulsified asphalt to the aggregate, it is possible that either of two things occurs. Either the colloidal particles are bound together into larger agglomerates and sufficiently waterproofed to diminish or eliminate their lubricant qualities, or else the rate of take-up of moisture by the structure as a whole is decreased until vapor loss through the surfacing occurs sufficiently rapidly to keep the moisture content of the base structure low.

However, there is still too little known in this field to speculate further on the mechanics. It is just good to know that there is a reliable and an effective tool for handling an increasingly important category of ma-

When normal production isn't enough...

that Pioneer Edge

PIONEER COMBINES PORTABILITY WITH HIGH PRODUCTION

No other central mix plant can match the PIONEER *Continuflo* when it comes to quick, easy portability. Each major unit is complete on its own tire-mounted chassis. No holes to dig, no special alignment necessary. Just pull in, hook up, lay pipes, and go to work. Pulling out is just as simple.

When it comes to high production, these plants are just as outstanding. The *continuous, uninterrupted* flow of material through the plant keeps trucks busy. Oil content, for instance, can be varied by remote control of the bitumen pump without shutting down the plant. Handy levers control gates on the aggregate feeder and also permit changes in mix while plant is operating. Gates on discharge hopper cut off flow to truck while a new one pulls up . . . still without slowing the plant. Heavy gauge materials and best obtainable pumps, bearings, etc., help keep maintenance at a minimum.

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Kiewit paves big runway in record time

"Fastest job we've seen," said a Corps of Engineers paving expert as he watched construction of the big runway at March Field Air Force Base.

It *had* to be fast. The runway was 10,000 feet long, 200 feet wide, and built to support wheel loads up to 200,000 lbs. Specifications called for a 1½" hot mix finish coat laid over a 2½" plant-mix binding course. Then there was an additional 75 feet of shoulder paving on either side of the main runway. *And winter rains were due to begin in a few short weeks.*

But Peter Kiewit Sons' Company, contractor on the job, knew their portable PIONEER *Continuflo* Central Mix Bituminous plant could be counted on to exceed its rated capacity while delivering a steady, uninterrupted flow of precision-mixed material.

It didn't disappoint them either, and as usual, Kiewit finished the job ahead of schedule . . . a regular occurrence when a skilled contractor has the PIONEER EDGE on his side.

Mail the coupon below for details on PIONEER *Equipment that will give you extra production.*

● Here's another Kiewit plant on the job. This one, also a PIONEER, Model 101, is shown on a 19.3 mile paving job near Burke, So. Dakota. This job called for 55,000 tons of hot mix.

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terials which are not satisfactory in themselves.

Coats Colloidal Particles

In the field of cohesive soil treatment, the major characteristic of interest is the capacity of the colloidal soil particles to take on large amounts of water and, in so doing, to lose virtually all their load-bearing capacity. The desirable goal here is to prevent the multitudes of colloidal soil particles from sliding over one another on cushions of water.

Treatment with emulsified asphalt attempts to do this through replacement of the water around the individual soil particles. The only difficulty is that it is very problematical as to whether sufficient of the water can be driven off, so that the asphalt can get right next to the soil particle and really coat it. If this basic asphalt-soil bond is not established, then water will gradually re-penetrate the structure during wet weather in such fashion that each individual soil particle will again be surrounded by water and the particles can again slide easily over one another under load.

Many types of cohesive soils have such a strong attraction for water that it is virtually impossible to drive out the last of the moisture and establish the asphalt-soil bond even under the best of drying conditions. Water will readily re-enter these soils and re-establish plasticity just as if the asphalt had not been there. Such soils are not suited to treatment with emulsified asphalt.

The more successful treating of plastic soils apparently operates by retarding the passage of moisture into the structure from the subgrades. If the climate is relatively dry or if the wearing course is moderately pervious, the moisture content in the base course will reach an equilibrium content well below that of the subgrade and will, therefore, show improved stability.

It is important to understand the basic difference in the manner in which both water and asphalt act on sandy and on cohesive materials. In sands, cohesion is needed, which can be provided by water or by a permanent "moistening" agent such as asphalt. Water is, therefore, an aid rather than a detriment and the treating of sands with emulsified asphalt is proportionately easier and freer of complications.

In the case of cohesive soils, however, there is such a great affinity for water that the only practical answer is to try to keep it out or to a very low content. Asphaltic materials are not waterproofing materials, but only retard passage of moisture. It is necessary, therefore, to pay great attention to original curing and to make any provisions possible for transferring moisture on to the atmosphere through the final pavement surface. Treating of cohesive soils is, therefore, proportionately more tedious and un-

predictable when asphalt products are used.

Classic Questions

There have been a number of classic arguments that have been carried on for some years regarding the merits and demerits of the various types of base course treatment. It might be helpful in this general survey to list some of these questions and to attempt to answer them in terms of the best available evidence.

Question: Do asphaltic materials possess basic advantages over portland cement in the stabilization of base materials?

Answer: This question has no clear-cut answer, inasmuch as certain classes of materials, notably sands, are, apparently, handled most satisfactorily and economically by asphaltic products; while some other types, such as highly cohesive materials, have been satisfactorily treated with cement. Much of the answer to this question depends upon the development of special handling techniques in certain local areas, as well as favorable climatic factors. It seems probable, however, that, as the picture clarifies, the bulk of sandy materials are likely to be asphalt treated whereas increasing amounts of cohesives will be handled with cement or combinations of cement and asphalt.

Question: Is the difference in moisture absorption and rate of transmittal through an asphalt treated base of basic advantage over the complete lack of water repellency in cement treated bases?

Answer: Cement treatment modifies a soil into a granular material or slab structure. For the same reason that asphalt emulsion treated sands are relatively insensitive to moisture, cement treated soils are also relatively unaffected from a stability standpoint by saturation.

It has been claimed occasionally that asphalt wearing surfaces would not adhere as readily to cement treated bases as to asphalt treated bases. This is directionally true, for, in certain areas, and particularly in dry climates, surface seals or armor coats may be used over emulsified asphalt treated bases when properly primed, while cement treated bases require standardly a 2 to 3 inch wearing surface.

However, this differential must be carefully handled with a complete knowledge and weighing of the effect of local climatic conditions.

Question: Is there any advantage to the use of a combination of cement and emulsified asphalt in a treated base material?

Answer: Yes. There is definite field and laboratory evidence that whereas the asphalt content under these circumstances lowers slightly the bearing strength of the cement treated soil, it increases the flexural strength and elasticity and results in less transfer of cracks through the wear-

ing surface. Benson, in his early studies on phase stabilization, also noted that combinations of the two materials often resulted in products showing better properties than could be achieved with either one separately.

This phase offers one of the most promising potentialities for future development in base course treatment and should be studied vigorously.

Question: Is an emulsified asphalt treated base of any unusual value as an underlay for cement slab highway construction?

Answer: Present evidence says "Yes." Concrete slabs curl upwards and then downwards as temperature and moisture content vary during the course of the day from the upper to the lower section of the slab.

Emulsified asphalt treatment of a base material, apparently, slows down the rate of moisture transfer into the slab sufficiently to minimize the variation in moisture content in the slab itself. The base also resists any pumping action due to rocking of the slab, furnishing a continuing solid support to the structure as a whole.

As our aggregate supplies become increasingly poor in quality and distant from construction projects, more and more research will be expended on means of bettering the qualities of available sources. Much information is already available on the use of emulsified asphalt for this purpose, and there is no question but that time will see the perfecting and broadening of those techniques and applications.

• All-night parking has been forbidden on 261 sections of 199 streets in Chicago. These streets are usually on trolley or bus lines or in business areas, or on arterial thoroughfares. Stopping is limited to three minutes for unloading or loading passengers and to 30 minutes for transferring goods between the hours of 4 A.M. and 7 A.M. Fines of $3 to $25 are scheduled for violators.

• **Bernard A. Lefeve** has been given permanent appointment as Director, Bureau of Highway Planning, New York State Department of Public Works, Albany. He will continue to direct also the Bureau of Research and Statistics.

DeHart Appointed Merchandising Manager. Henry T. DeHart, formerly GMC Truck advertising manager, was appointed merchandising manager and will be responsible for truck advertising, sales promotion, sales training, parts sales promotion and used truck activities. Mr. DeHart first became associated with GMC Truck and Coach in 1929 as assistant advertising manager. In 1933 he became advertising and sales promotion manager.

In bidding . . .

"In your bidding, check the unknown, double-check the unfamiliar to be sure you know what you are bidding on, make some allowance for contingencies, watch the trend in business this year to see what price trends are going to be in materials."

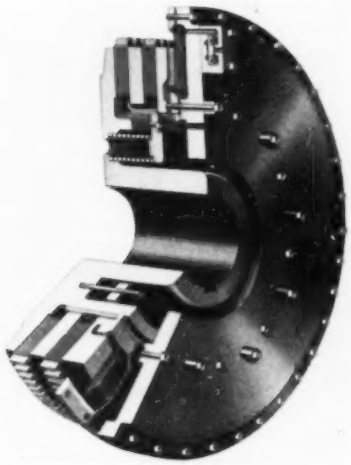
—Guy C. Kidoo, Vice-President First Natl. Bank of Chicago

I-H Truck Sales Changes. W. K. Perkins, manager of sales, motor truck division, International Harvester Co., Chicago, Ill., has announced the following changes in motor truck district management: Chauncey L. Sears has been appointed manager of the company's Harrisburg motor truck district sales operation, succeeding M. H. Roth, who has been transferred to Seattle, Wash., in a similar capacity. Sears goes to Harrisburg from Columbus, O., where he served as motor truck district sales manager for the past four years. Sears' transfer to Harrisburg marks his return to that city where he was assistant district manager prior to World War II. Roth served at Seattle and Oakland, Calif., prior to his appointment as district manager at Harrisburg in 1949. J. H. Baker has been appointed manager of the company's Columbus, O., motor truck district sales office. Baker goes to Columbus from Seattle, where he served in a similar capacity for the past 10 years.

WHAT'S NEW
in Equipment and Materials

New Clutches Handle Higher Torque Capacity

A new Twin Disc Model PO, a series of air-actuated clutches, designed to handle higher torque capacity loads with more compactness and with more efficient transmission of work, has been introduced by Twin Disc Clutch Co. Even with its added torque capacity, the new PO air-actuated design is actually lighter in weight and more narrow in clutch width. This unusual compactness permits the new PO to be installed in less shaft space, with closer shaft-bearing center distances. A single set of air-cooled springs assures quick, positive plate release and equal distribution of release pressure. Air actuation is effected through insulated and air-cooled diaphragms—and is unusually smooth and accurate. Built to maintain maximum power transmission efficiency even under adverse operating conditions, the new PO air-actuated clutch has all parts fabricated from specially developed alloys, for maximum strength to withstand heavy shock loads and tooth wear.



New Twin Disc Actuated Clutch, Model PO

For additional information circle Number 18 on inquiry card.

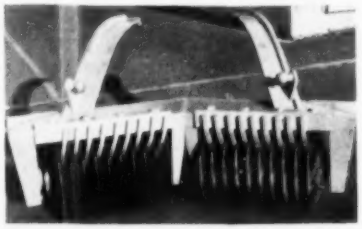
Cement Additive for Integral Waterproofing

Full-scale production of Drycrete, a cement additive for integral waterproofing, has been announced by Shield Chemical Corporation after on-site testing over a period of years. Drycrete, which is a non-water-soluble liquid, will make cement, concrete or stucco waterproof when dispersed throughout the mix, according to company president, Joseph W. Bristol. It is especially recommended for use in new construction, both in parging and mortar, for foundations, walls inside and out, concrete bridges, etc.

For additional information circle Number 49 on inquiry card.

Disc Attachment for All Motor Graders

A new disc attachment, the Shav-O-Disc, mountable on all types and models of motor graders, announced by T & M Manufacturing Co., was developed by experienced road maintenance men to serve as a less expensive and cumbersome road discing equipment which leaves the motor



Shav-O-Disc Disc Attachment

grader blade in free operation. The Shav-O-Disc operates under the full weight of the motor grader, cuts out its own furrows to a width of 64 in., weighs 1,740 lb. and its parts are all replaceable from standard stocks.

For additional information circle Number 44 on inquiry card.

Tool Insures Proper Matching of Tires

A handy new dual tire matching caliper, designed to help give more efficient fleet operation and lower cost per mile for truckers, has been announced by John F. Arthur, manager of truck tire sales, United States Rubber Co. This tool may be used to insure proper matching when installing new tires or when rotating tires. Also, where a trucker stocks recapped or repaired tires, he can identify them by measurement for ready reference when matching them with the tires on his trucks.

For additional information circle Number 57 on inquiry card.

One-Man Saw Designed for High Speed Cutting

A new, one-man chain saw designed for high-speed timber cutting in construction and land-clearing work was introduced in April by McCulloch Motors Corporation. This new Model 4-30 is stated to have ample power to cut rapidly through timber up to 5 ft. in diameter, yet its light weight

New McCulloch 4-30 Chain Saw

and balance make it easy to use and fast for cut-off work in any position. In actual dynamometer tests of the new saws, right off the production line and before breaking-in, the factory reports more than four brake horsepower for its new model. The 4-30 weighs only 30 lb. complete with a 14 in. chrome-plated blade and chain. Blades available range up to 36 in. In length. A 15-in. bow attachment is also available.

For additional information circle Number 38 on inquiry card.

Tractor Over Drive Gives Speed of 34 Miles

An overdrive for its DW20 four-wheel tractors, developed by Caterpillar Tractor Co., is stated to give a top speed of up to 34 miles per hour. On DW20s with the 15.75 to 1 final drive reduction, the maximum speed with overdrive is now 34 mph., an increase of 8 mph. over a similar unit without overdrive. Addition of overdrive to tractors with the 21 to 1 final drive reduction increases the top speed from 20 mph.

Shift Lever (In Operator's Right Hand) for New Overdrive

to 25 mph. Combined with the present standard transmission, the overdrive gives the tractor a range of 10 speeds forward and two in reverse. Overdrive is now available as an attachment on new machines coming from the factory or for installation on units now operating in the field. This attachment, a compact unit entirely designed and built by Caterpillar, is mounted between the engine and transmission of the tractor and is controlled by a manually operated shift lever located next to the regular gear shift lever. Installation requires a special transmission front cover, a clutch shaft and a universal joint, all of which are supplied as part of a special package the company has available for field installations. The only other modification required on the DW20 is cutting a slot in the floor plate for the overdrive shift lever. The seat does not have to be removed to install this unit.

For additional information circle Number 46 on inquiry card.

Twin Boom Drill for Pipe Line Trenching

A new twin boom pipe line drill is the latest addition to the line of construction tools of Schramm, Inc. Designed for rock drilling for pipe line trenching the outfit is completely mechanized. The twin drill air

Twin Boom Pipe Line Drill

feeds assemblies and drifters are suspended from crawler tractor booms. With a Schramm 600 c.f.m. diesel engine compressor towed for the power unit it becomes a self-contained continuously moving drilling unit, that can be used wherever crawler tractors can operate. The centrally located drill, blow and feed controls enable one man to operate both drifters when ground conditions are right.

For additional information circle Number 58 on inquiry card.

Reflectorized Stake Delineator Is Splash Proof

"Saf-T-Stake"—a new splash-proof stake delineator—reflectorized for marking curves both day and night on highways, streets and parkways—has been announced by Minnesota Mining and Manufacturing Co. The stake has a reflective area of 1¾ in. x 24 in. of silver "Scotchlite" brand reflective sheeting. It is 8 ft. long with a 2 by 2 in. 90 degree angle and is made from 14 gauge sections of galvanized rust resistant steel. One of the outstanding features of the stake is the specially designed baffle guard which acts to keep road splash of rain, mud, and snow from the reflective surface. The baffle guard is formed by the non-reflective side of stake being positioned parallel to the highway.

For additional information circle Number 45 on inquiry card.

Makes Photostats in Less Than 60 Seconds

Photocopies of any office record can now be made by one machine in less than a minute without developing, washing, fixing or drying. Called the Transcopy Duplex this product of Remington Rand Inc. makes finished, photo-exact, positive copies of any record, regardless of type or color, from originals up to 14½ in. wide in any length. The Transcopy Duplex is a two-in-one unit—a single machine containing both a printer and a processor. Extremely small, light and compact, Transcopy Duplex takes not much more space than dictating equipment. No special installation is required—the machine operates after being plugged into any electrical outlet. No darkroom is needed.

For additional information circle Number 35 on inquiry card.

Dump Body for "Hot Materials"

A special 5.3 cu. yd. corrugated steel dump body for hauling "hot materials" has been announced by the Galion Allsteel Body Co. This body, weighing 2,730 lb. was designed primarily for hauling hot slag from open hearth furnaces to fill dumps, and then carrying magnet-salvaged

Special Dump Body

or reclaimed slag on the return trip. Because of its corrugated construction, the body presents double the usual area for cooling purposes when transporting molten slag. It is also said to be many times more resistant to wear and friction of rough, abrasive salvaged slag. In addition to their steel industry applications, Galion corrugated bodies are suitable for many other uses such as transporting heated aggregates for roof coating and flooring, "hot mix" road materials, hot castings, etc. They are particularly recommended for jobs involving heavy shovel loading of extremely abrasive materials.

For additional information circle Number 50 on inquiry card.

Two New Lift Trucks Announced By Hyster

Two completely new fork lift trucks in capacities of 3,000 and 4,000 lb. have been announced by Hyster Co. They are Models YC-40 and UC-30, powered by heavy-duty, water-cooled industrial engines and mounted on cushion type tires. Outstanding features are said to be their extreme compactness, durability and maneuverability. The YC-40 has a capacity of 4,000 lb. at 24

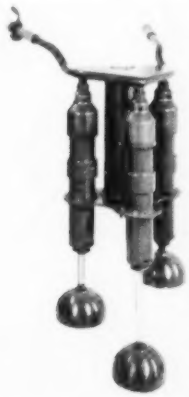
Hyster Model YC-40 Lift Truck

in. load centers. Its narrow width of only 38 in. and short overall length of 78½ in. permit it to operate with speed and efficiency inside of boxcars and in crowded quarters. Its low collapsed height on only 82½ in. permits it to pass through ordinary doors and under low ceilings. The load can be raised 30 in. before the minimum height is affected. Ample underclearance allows safe travel over rough surfaces and inclines. The YC-40 will climb a 20% grade loaded or empty. The UC-30 is basically the same truck as the YC-40 but with 600 lb. less counterweight and a capacity of 3,000 lb. at 24 in. load centers.

For additional information circle Number 36 on inquiry card.

New Tamper Designed for Faster Compaction

A new model added to the standard Triplex backfill tamper line of Gunderson-Taylor Machinery Co., is designed for faster, more efficient, economical backfill compaction. This Super Triplex is stated to be 20 to 40% faster than the standard



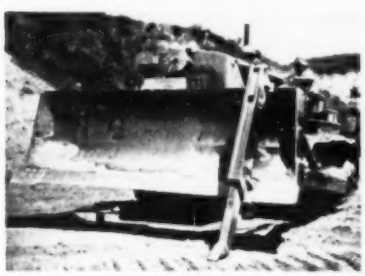
Super Triplex Tamper

Triplex model, and to impart 40% heavier impact and more vibration to soil being compacted. The Super Triplex weighs 45 lb. more than the standard model, but is just as easy to handle and just as safe. The new unit incorporates a 1 in. larger piston. Its effective compaction area is 90 to 100 sq. in. The Super Triplex offers 40% more power than the standard Triplex without loss of blows per minute (2,100). It compacts to the same density as the standard model, with substantially higher lifts.

For additional information circle Number 53 on inquiry card.

New Type Ripper for Bulldozer Blades

A new type ripper for use on the front of Caterpillar tractor bulldozer blades, now in production by Preco, Incorporated, is stated to have proved unusually effective for confined dozing under extremely rough conditions, for pioneering, for steep down-



Preco Dozer-Ripper

hill dozing, for bank sloping and for breaking blacktop and light concrete. Known as the Preco dozer-ripper, the unit clamps onto the front of Caterpillar 8S and 7S bulldozers and can be adjusted to rip to depths of 22 in., 15 in., or 8 in. or can be fully retracted. Either one or two dozer-rippers can be used on the same blade. Both the replaceable tooth and the shank of the ripper are made of heat treated chrome molybdenum steel. The entire unit weighs approximately 650 lb.

For additional information circle Number 17 on inquiry card.

New Truck Loading Hopper For Asphalt Plants

A new improvement in its Continuflo line of asphalt plants is offered by Pioneer Engineering Works, Inc., a subsidiary of Poor and Co., Chicago, Ill. Recently announced was the design and installation of a new type truck loading hopper with twin clam gates on the mixer units of both the Models 51 and 101 continuous process plants. This new hopper permits discharge of material from the pugmill into trucks with least possible segregation of mix. The gates are steam-cylinder actuated by means of a lever extending up to the operator's platform. Capacities of the discharge hoppers have also been increased. The hopper on the small mixer now holds over a ton of material, whereas the hopper on the large mixer holds approximately two tons. Thus there is provided ample time for changing trucks without shutting down the machine. Together with the addition of the new twin clam gates, the increased hopper capacities permit operators to unload a uniform, non-segregated mix at a steady, profitable pace.

For additional information circle Number 54 on inquiry card.

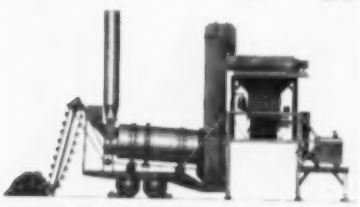
New Hard Surfacing Welding Rod

A new hard surfacing welding rod designed to give equal and, in some cases, better wearing results than even tungsten type rods, has been announced by Rankin Manufacturing Co. The new rod is called Ranite "F." The company claims the rod may be applied in the conventional manner or used with a newly developed procedure to obtain even better results.

For additional information circle Number 32 on inquiry card.

Portable Integrally Powered Asphalt Plant

A new completely portable, integrally-powered batch type asphalt plant, placed on the market by Standard Steel Corporation, incorporates many of Standard's major stationary asphalt plant features. The plant is 1,000 lb. capacity and is mounted on its own rubber-tired wheels. Complete with its own gasoline or diesel engine for operational power, it makes a very compact unit. All that is required to place the portable unit plant in operation is to raise the mixing unit by means of an elevator device. Within a few hours from the time this portable unit is spotted into position, it is ready for operation. In transit the plant complies with highway clearances involving both height and weight and may be towed with a truck-tractor.



New Portable Asphalt Plant

For additional information circle Number 31 on inquiry card.

Synthetic Soil Conditioner For Erosion Control

A synthetic soil conditioner which has been effectively demonstrated to help control rain and wind erosion on construction sites, levees, rights-of-way and similar applications, has been announced by the Organic Chemicals Division of Monsanto Chemical Co. The product, to be sold under the trade name Bondite soil conditioner, is designed to stabilize aggregates on the soil surface to hold the seed and soil in place until vegetative cover crops germinate and become established. According to company tests of more than a year's duration in 21 states and under a variety of soil and weather conditions, the conditioner is ordinarily effective at the rate of 1 lb. per 100 sq. ft. or 436 lb. per acre. Half this rate has proved effective under some conditions. It may be applied as a powder or as a water solution.

For additional information circle Number 30 on inquiry card.

Chemical Cuts Mowings From 19 to 2

A new chemical that temporarily stops the growth of grass for as long as two months without damaging it has been announced by United States Rubber Co. The new chemical is MH 40, and the active ingredient is maleic hydrazide which was developed by the Naugatuck Chemical Division, United States Rubber Co. Extensive testing on cultivated areas along parkways has demonstrated it can cut the number of mowings needed each season from 19 to 2. MH 40 is a water soluble powder. Each pound contains four-tenths of a pound of maleic hydrazide. A minimum of 50 gal. of water is mixed with each pound, and this solution will cover approximately an acre of grass. For even control of grass growth a power sprayer is necessary. However it is possible to obtain adequate growth control on waste grass areas with hand spraying equipment.

For additional information circle Number 42 on inquiry card.

New O T C Hydraulic Shop Press

A new inexpensive hydraulic shop press, capable of developing 17½ tons, has been announced by the Owatonna Tool Co. The press is equipped with the 17½ ton power twin ram which serves a dual purpose since it can easily be detached from the press and used as a portable power unit. This unit is readily attached to the company's grip-o-matic pullers and push-pullers for field or shop maintenance operations and can be used as a lifting jack as well. The press comes equipped with the new hydraulic hand pump which develops 10,000 psi. and a 6-ft. pressure hose connects the pump and ram. A 15,000 psi. gauge is supplied to provide actual pounds or tons pressure used.

OTC Shop Press Y-106A

For additional information circle Number 22 on inquiry card.

New Tire Has More Cords Per Inch

A new highway truck tire has been introduced by General Tire and Rubber Co. The body of the tire is reinforced with thousands of extra cords of rayon, tension-controlled for uniformity in stretch and flex. Shock-absorber construction, with live rubber between each ply, adds greater strength and greater resistance to breaking and bruising. A deeper, wider, flatter tread on the tire distributes the load over more tread area—a feature designed to give truckers slower, more even wear, plus more road contact for better braking and more positive traction. Other key features

of the tire, built in for maximum durability and service, are a ribbed sidewall to eliminate bruising and scuffing; a stronger carcass to provide more original miles and more recap miles; and a straight shoulder rib to provide easier steering by elimination of side slip and sway on curves.

For additional information circle Number 59 on inquiry card.

Portable Hand Membrane Spraying Rig

A new portable hand spraying rig designed for spraying membrane curing compounds on small street jobs, bridge decks,

Portable Hand Spraying Rig

sidewalks, walls, etc., has been announced by Flexible Road Joint Machine Co. The unit is capable of dispensing up to 6 gal. per minute. Simply set 55-gal. drum of compound on desk and insert pipe into drum opening, start the 1½ hp. engine and commence spraying. A metering valve controls amount of material going through ¾ in. hose to nozzle. Nozzle controls spraying. By-pass system returns unused material to drum keeping compound constantly agitated and of the right consistency. Entire unit, including 55 gal. of compound, weighs only 735 lb. and can easily be pulled on 4 in. x 16 in., zero pressure, rubber-tired wheels.

For additional information circle Number 11 on inquiry card.

New Ammonia-Type Whiteprinter

A new Speed Master Model S, a medium priced, volume production ammonia-type whiteprinter, has been developed by Peck & Harvey. The new Model S uses a 2,000 watt high pressure Vicor jacketed glass lamp and the dry ammonia-fume method of diazo reproduction. Printing speed from 6 in. to 14 ft. per minute; develops fully at 8 ft. per minute; no fading of prints nor need for double development. Newly devised blower system provides coolest contact glass surface, protects originals. Handles cut sheets or roll stock up to 42 in. wide in any length. All front delivery; all front control.

For additional information circle Number 24 on inquiry card.

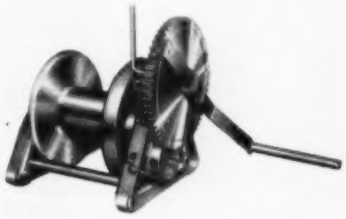
Portable Sand Blaster Built for Long Life

The "Block Buster," a new sand blasting application incorporated in an easy-to-operate portable machine has been placed on the market by the Corson Co., Inc. The machine is engineered for economical operation and long life. It has no moving parts nor mixing chambers to wear out. It operates from any direct air line or compressor having 80 lb. or more pressure and the average air consumption is 30 to 35 cfm. depending on nozzle size and air pressure used; pressure is adjustable to from 30 to 120 lb. for each specific job. The machine has many applications, among them being: cleaning bridges, structural steel and construction equipment preparatory to repainting.

For additional information circle Number 62 on inquiry card.

Hand Winch Combines Strength With Light Weight

A mechanical hand winch with low gear load capacities up to 10,000 lb., designed for optional use with a 1 in. electric skil-drill, has been announced by Stampco Products Co. The winch is readily portable, of all-steel electric weld construction to



Stampco Handiwinch

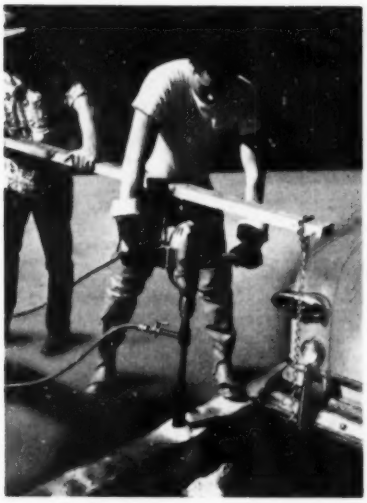
combine strength with light weight, and has both high and low gearing for job versatility. Brake design allows for safe accurate load spotting with finger pressure control, and features a self-operating ratchet ring. The heavy duty, chisel-type, spring loaded dog permits jam-proof operation of the braking device. Machine cut gears and precision fit, self-lubricating

bronze bushings on the equipment cut friction to a minimum, the manufacturer says. Load capacity at low gear is 10,000 lb. at 27:1 reduction; capacity at high gear is 1,900 lb. at 4.5:1 reduction.

For additional information circle Number 40 on inquiry card.

Water Feed Attachment Speeds Concrete Drilling

A water feed attachment for use with special Tilden Rotary Koncrete Kore drills is the newest development of the Tilden Tool Manufacturing Co. Made for use with special Tilden water feed Koncrete Kore drills of 1½ in. in diameter, the water attachment has a smooth swivel action even under rugged drilling conditions. Water flowing through the drill's core cavity efficiently removes cuttings and debris, and, at the same time lubricates and cools the drill. Tilden water feed drills are specifically designed for production drilling of holes more than 4 in. deep where many holes are required. Tilden states that these new drills are particularly advantageous for drilling concrete, including crossed reinforcing rods. They can be used in ordinary electric and air drill motors with ¾ in. chuck size or



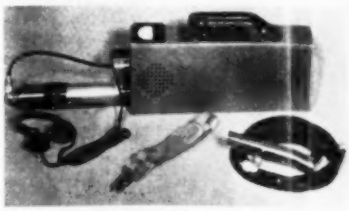
Tilden Konkrete Kore Drill Equipped with New Water Feed Assembly

larger, and with No. 3, No. 4 and No. 5 Morse tapers.

For additional information circle Number 39 on inquiry card.

Ultra Sensitive Geiger Counter Has Many Uses

A newly engineered, ultra sensitive, Model 105-D prospectoscope for radio active mineral prospecting has been brought out by The Radiac Co., Inc. The Model 105-D can be used for prospecting from low flying aircraft, from a moving vehicle or on foot, and also for probing drill holes to depths of 50 ft. The Prospectoscope is stated to be equipped with the largest gamma sensitive Geiger tube ever placed in a survey instrument. The Geiger tube overall length is 26 in. and the diameter is 2 in., thus, it is claimed, giving the Prospectoscope a sensitivity 30 times greater than any other standard Geiger tube. It can be taken out of the instrument and fitted with ease to the 50 ft. coaxial cable provided. The Prospectoscope also features a standard size beta-gamma Geiger probe, which is interchangeable with the giant size tube. An accurate meter having five ranges gives the prospector a broad selection of instrument sensitivities. A built-in speaker gives an aural indication of radioactivity. For aerial surveying, where airplane engine noise is excessive, earphones are provided. Weight of the complete instrument is 14 lb.



Model 105-D Geiger Counter

For additional information circle Number 10 on inquiry card.

Larger Warning Sign for Greater Safety

A heavier and larger 38 in. high Senior-Size "A" stand for greater visibility is offered by Eastern Metal of Elmira, Inc. The same features of Eastern's 27-in. Regular "A" stand are incorporated in the new Senior "A" stand. It is compact, lightweight, easy to store, quickly assembled, holds two warning flags, and will not blow

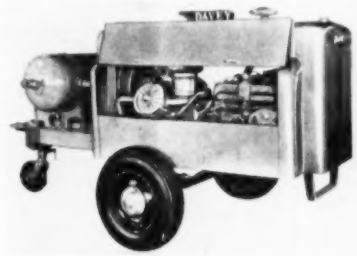
38 In. High Stand

over in heavy winds or backwash of passing traffic.

For additional information circle Number 47 on inquiry card.

New Air Compressor Is Light and Compact

A new 210 cfm. compressor of high speed 2-wheel trailer design has been announced by Davey Compressor Co. The new unit, known as Super Chief Model 210-WDS, is



Super Chief Model 210-WDS Compressor

145 in. long, 62 in. high and 75 in. wide. Weight is 3,400 lb. The compressor unit is of W series design and is equipped with newly developed Davey multi-port valves. Engine is of Hercules 6 cylinder design with a power surplus of over 25 per cent.

For additional information circle Number 33 on inquiry card.

New Alloy Steel Retractable Wheel Chock

A new alloy steel wheel chock, which retracts away from the wheel, regardless of how tightly the tire wedges against it, has been introduced by Calumet Steel Corp. Called the Casteel Retractable wheel

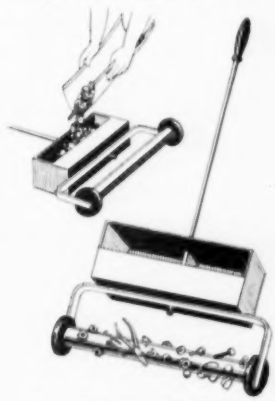
Casteel Retractable Wheel Chock

chock, the new unit is constructed with alloy steel castings of high tensile strength, and is designed to hold any truck, trailer or tractor safely spotted in parked position. Operation of the retracting feature is simple: when it is desired to release the chock, the combination trip lever and handle is depressed, causing the face or bearing plate of the chock to pull back away from the tire. Because of this backward movement, no amount of wedging action can affect the chock's retraction in removal. A positive safety lock prevents premature retraction.

For additional information circle Number 52 on inquiry card.

Magnetic Sweeper Claimed to Be Radically Different

A rotating magnetic sweeper, claimed to be radically different, has been announced by Multifinish Mfg. Co. This sweeper employs the rotating principle of their well known rotary magnetool but "Series 60" is of much greater capacity and unloads



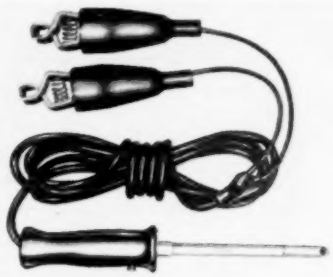
Heavy Duty Magnetic Sweeper

simply by stripping off the thin tough Neoprene Nylon cover from which the accumulated tramp iron is poured into a collection box attached to the frame. The entire 8 in. circumference of the magnetic housing loads up with iron to a thickness of 1½ in. Clearance under the housing is 1½ in., allowing large parts to be picked up. When the collection box is full, it is easily removed for emptying.

For additional information circle Number 34 on inquiry card.

Quick Heating Battery Soldering Iron

A soldering iron which can be connected to either 6 or 12 volt batteries, announced by Hexacon Electric Co., is claimed to melt solder in 20 seconds. It will generate any degree of heat required for soldering lightest or heaviest work. Will do three times heavier work than size indicates because element is embedded in tip, yet tip is small enough for finest soldering. Switch



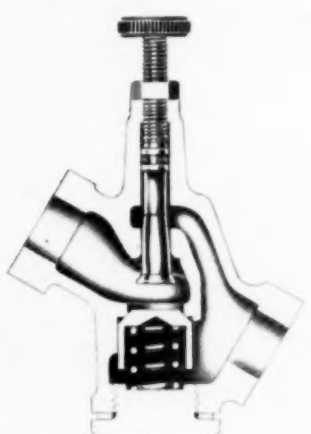
Battery Soldering Iron

button controls heat. Recommended for use on planes, trucks, cars, tractors, boats, steam shovels or any vehicle having battery equipment. Regular nickel-chromium heating element—not a carbon unit. Tip and element are one unit—as easy to replace as a lamp bulb. Equipped with 12-ft. abrasion-and-oil resistant rubber heater cord, battery clips and non-breakable plastic handle.

For additional information circle Number 43 on inquiry card.

New Speed Control Valve for Air Flow

A new speed control valve has been announced by Ross Operating Valve Co. The valve, which can be used wherever it is necessary to control the flow of air, provides split-second timing of piston movement by positive control of air flow. It can



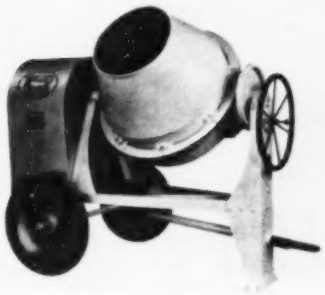
Speed Control Valve

be mounted in any position between the operating valve and one or both ends of a cylinder to provide air flow adjustment. An outstanding feature of the valve is the ease of adjustment, accomplished by the many turns provided on the adjusting stem. The orifice controlling this flow can be quickly adjusted from practically zero to wide open.

For additional information circle Number 9 on inquiry card.

New 6-S Tilting Concrete Mixer

A new 6-S tilting concrete mixer has been added to the line of Muller Machinery Co., Inc. The mixer is equipped with a Briggs and Stratton air-cooled gasoline engine rated at 7.7 hp. at 2,700 rpm., which incorporates the new exclusive Briggs and Stratton quick starting feature. The mixing drum is of pressed steel welded construction. The gear ring is so located as to balance the drum for easy tilting. Timken bearings are installed on the drum spindle as well as in the countershaft bearings. The disc type wheels are also equipped with Timken bearings. They are fitted with 5.50 x 16 pneumatic tires for high speed towing as well as easy placement on the job.



New Muller 6-S Tilting Concrete Mixer

For additional information circle Number 12 on inquiry card.

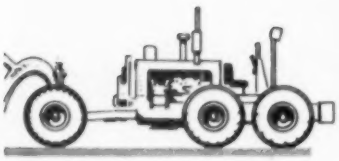
Newly Engineered Wheel Pipe Cutters

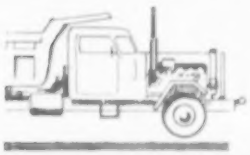
A newly engineered, redesigned line of wheel pipe cutters is now being manufactured by Beaver Pipe Tools, Inc. Coated with a tough, long-wearing, oven-dried lacquer finish, this new tool is available in two popular sizes: No. 2 for ⅛ in. to 2 in. pipe, and No. 4 for 2 in. to 4 in. pipe. Rugged but light, the shape has been specially engineered for added working comfort, balance, speed and easy handling. Changes in cutting design permit power to be applied directly to the cutter wheel. There is no wasted pressure or effort. The cutter wheel, being close to the slide track of the guide block, cuts down slide block wobble. Thus, there is excellent tracking and a finer degree of accuracy when pipe is cut.

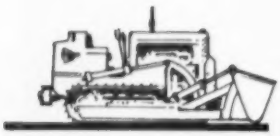
Nos. 2 and 4 Wheel Pipe Cutters

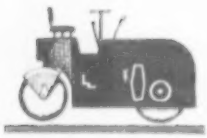
For additional information circle Number 20 on inquiry card.

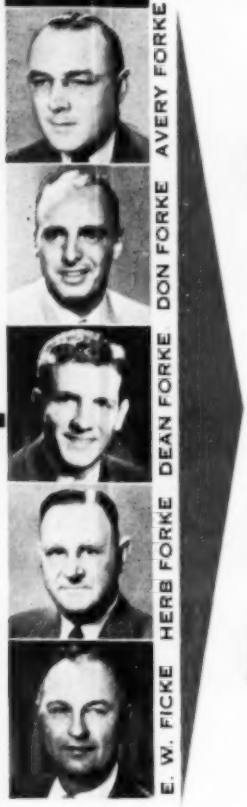
Out in front by far...











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8—Euclid Bottom-Dump 13 c.y. Tractor-Wagon Units, Model 38FDT, G-M 671 and 6A Diesel Engines, with 89W Wagons, 24:00x25—24 ply tires. New 1950.

28—Euclid Bottom-Dump 13 c.y. Tractor-Wagon Units, Model 71FDT, 6-M Model 6A Diesel Engines, with 89W Wagons, 24:00x25—24 ply tires. New 1951.

9—Euclid Model 8TD Rear Dump Units; 56Y Bodies with side extensions, 16.8 c.y. capacity. Powered by Cummins Model 27575P Diesel Engines. New 1950.

5—Euclid Model 49FD Rear-Dump Units, with 48BY Bodies, 12 c.y. capacity, powered by G-M Model 671 Diesel Engines.

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5—Caterpillar Model D8 Diesel Tractor-Dozers, all in 8R Series, Serial Nos. 8R9135SP, 8R9048, 8R8981, 8R8423, 8R8073.

2—Caterpillar Model 12 Graders, with scarifier and canopy top, powered by Caterpillar 9K Diesel Engines; Serial Nos. 9K1848 and 9K1501.

3—LeTourneau Model CIH Scraper Units, 12 c.y. capacity, Cummins HBID Diesel Engines; equipped with Model LP Scrapers. Serial Nos. C3T2887, C3T2886, C3T2826.

1—LeTourneau Model K30 Rooter, three-tooth, extra heavy, Serial R3032-K30B.

1—Rome Disc Harrow, 4 sections, 6 discs per section, 28" diameter; Model M-24-28.

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2—Worthington 2-Stage Diesel Engine Driven Turbine Pumps. Model #12QGH2, Serial Numbers 1349450-51. Capacity 1500 G.P.M. at 110' Head Operating at 1770 RPM. Driven by General Motors PTA-11111 Diesel Engine, Serial #130592 and 131789. Equipped with Worthington Right Angle Drive Gear Heads and Watson Spicer Flexible Drive with Couplings. New 1950. Has had stand-by use only.

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Address inquiries to:

Peter M. Bianchi, Project Manager

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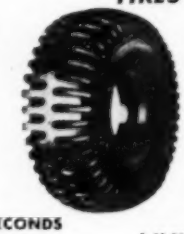

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Dryers, Aggregate Hoppers, Steel, Storage Tanks, Bucket Conveyors, Pug Mills, Scales, Boiler, Pumps, Electric Motors, Exhaust and Dust Collecting System. Will sell entire Plant or any part. Structure also available.

ACORN IRON & SUPPLY CO.
915 N. Delaware Ave. Philadelphia 23, Pa.

FOR SALE
P & H 855
2 CUBIC YARD SHOVEL
CAT. D-17000 DIESEL ENGINE
PRICE $28,000

SERVICE SUPPLY CORP.
20th & ERIE AVE.
PHILADELPHIA 32, PA.

Liquidating C. G. Bridges Estate, (ROAD CONTRACTOR Escanaba, Mich.)

3—DW 10 Caterpillar Tractors & Wagons, Serial #1N-2925-6-7
1—D-6 Cat tractor cable bulldozer—2-H-7821
1—TD-14 Int. tractor—Hydraulic bulldozer TDFM 17937
1—Galion EZ lift pull grader, 12 ft. blade
1—Adams Power Grader; Model 311, diesel. Very good.
1—1 yd. "Teco" scraper
1—315 ft. Ingersoll Rand Portable gas engine driven Compressor
1—160 ft. Davey Portable Compressor, pneumatic tires
1—Ottawa Self propelled Hydra Hammer for breaking concrete
1—Galion stone spreader
1—Seaman Tiller without power (type C)
1—McCormick Deering Farmall Tractor
1—½ yd. Bay City Crawler Shovel, Model 30
1—¾ yd. Buckeye Crawler Crane & Dragline, Model 70
1—¾ yd. Northwest Shovel & Dragline, Model 25
1—50 & 1—51 Ford Pick-up
5—GMC 1949 Dump trucks
2—Ford F-6 Dump trucks 1949
28—Fire rope 1—2—3 & 4 Sheave Blocks

THIS EQUIPMENT IS PRICED TO SELL

MERTES MACHINERY COMPANY, 1622 So. 1st, MILWAUKEE 4, WIS.
ASK FOR MR. PARENTEAU

FOR SALE
WHILE THEY LAST

38—New, unused, G. M. Diesel Power Units, Model No. 4060, Series 71, 110 H.P., 2000 RPM, 4-cylinder, complete with 5-speed Brown Lipe transmission, air compressor, starter, generator, oil filter, temperature gauge, oil gauge, fan belt and voltage regulator. Gross weight 2746# boxed. Box measures 40" wide x 77" long x 49" high, cu. 87.5

Original cost approximately $4700.00.
Dealer's Resale Price $1975.00, f.o.b. Louisville, subject prior sale.

Karl Nussbaum and Sons, Inc.
29th & Garland - Louisville 11, Ky.

FOR SALE

Cleaver Brooks, 3 car steam heater, new July 1951, used very little, excellent condition.

Roller 8-10 ton Buffalo Springfield, 6 Years old, very good condition.

½ Yd., Williams digging bucket without teeth, used as a clamshell, very good condition.

1 Yd., American Gopher, Model 400 shovel front and stick, very good condition.

½ Yd., 15B shovel front and stick, very good condition.

1 90 Horsepower Kewanee high pressure boiler, portable, very good condition.

All items listed subject to prior sale or other disposition.

FLINN PAVING COMPANY
210 So. 18th Street
Omaha, Nebraska

— FOR SALE —
ST. PAUL DUMP BOX AND HOIST

Practically New, 10-yard. Will give new unit guaranty. Box originally sold for $2,500. Will sell for 50% of new price.

FLETCHER CONSTRUCTION CO.
BOX 67 MENOMONIE, WISCONSIN

D. D. KENNEDY, INC.
MADISON ST. & MANNHEIM ROAD
HILLSIDE, ILLINOIS
Phone: EStebrook 8-5223
Suburban Linden 4-2520

1—HD14 Allis-Chalmers w/Baker hydraulic straight dozer 11' wide blade. Good tracks, rollers, & sprockets, new paint job and in excellent condition.

1—TD9 International crawler w/Hough cable loader 1 yard capacity bucket.

1—Model 10D Caterpillar motor grader, scarifier, cab & cab heater. Machinery clean; tires excellent condition.

1—D6 Caterpillar tractor w/Trackson cable loader, 9V series.

1—D6 Caterpillar tractor w/T6 Trackson cable loader. New paint job, engine and loader A-1.

1—D7 Caterpillar tractor w/Trackson loader.

1—4 wheel rubber tire LeTourneau 12 yard scraper—immediate delivery.

1—Adnun black top paver—very good condition, complete with six cylinder Herculese engine, 12' extension & electric screed heater.

1—Blaw-Knox paving finisher XE series, machine used 2 days—like new condition. Standard width combination 20-25', double screeds, 4 steel wheels, pneumatic rubber transport wheels and hitch.

1—Erie Strayer portable concrete mixer mounted on rubber tires, electric motor driven, 1 yard mixing capacity, complete with cement bin and cover, elevator chain, tackle block and loading hopper. Unit in very good condition.

1—Jaegar paving spreader serial 50x802, width 20-25' with all attachments, Continental gas engine, new 1950 and in good condition.

Used
R. B. FINEGRADER

25' width, completely overhauled. Excellent condition. Will sacrifice. Price F.O.B. our yard $6,500.00.
5000 Ft. Heltzel 9x9¼" Road Forms. Used only 3 months. Like new.

H. B. Fuller Equipment Co.
8200 Jones Road, Cleveland 5, Ohio
Phone: BR 1-3020

ASPHALT & OIL TANKS
IN MO. - TEX. - N. Y. - FLA. - KANS.
33—8000 & 10,000 GAL. R.R. TANK CAR TANKS WITH COILS.
6 HORIZ. 15,000 & 20,000 GAL.
9 VERT. 15,000, 42,000, 120,000 GAL.
LESTAN CORP., ROSEMONT, PA.

QUALITY USED EQUIPMENT

Backed by Your CATERPILLAR DEALER

REG. U. S. PAT. OFF.

We guarantee the equipment — to be exactly as listed — and our long experience as a Caterpillar Dealer . . . is your assurance of our integrity.

TRACTORS

2 CATERPILLAR D8 TRACTORS, canopy top, crankcase guard, pull hook, 22 in. tracks. LeTourneau DD Cable Control, good operating condition. Each $6,000

INTERNATIONAL TD24 w/ Bucyrus-Erie Dozer & DD Cable Control. Two yrs. old, well cared for—excellent condition $14,500

INTERNATIONAL TD18A w/ Isaacson Hydr. Dozer, radiator and crankcase guards, pull hook, late type rollers. Rebuilt 4 mos. ago $7,500

CATERPILLAR D4-44" gauge w/ LaPlant Choate Hydr. Dozer. Rebuilt and Guar. $5,250

SCRAPERS

2 LE TOURNEAU Model F Scrapers. Good working condition. Right off job. As is $4,000

GRADERS

AUSTIN-WESTERN 99H 4-wheel drive Motor Grader. U14 Diesel Engine, cab, scarifier, 12' blade, tires 85% good. Top shape $7,500

AUSTIN-WESTERN 99H 4-wheel drive Motor Grader with Bulldozer. S/N H1952. New 1949 tires 85% good $9,000

ALLIS-CHALMERS AD4 Motor Grader. GMC Diesel Engine, 104 HP., scarifier, canopy top, 12' blade, 13.00x24-8 ply tires all around. This unit 2 yrs. old—like new $7,250

CRANES

MARION 362 1½ yd. crane, 60' boom, CAT D13000 Engine, good condition $13,000

H. O. Penn Machinery Co.

140th Street & East River, New York 54, N. Y.

MAIL TODAY

H. O. Penn Machinery Co., Inc.
140th and East River
New York, N. Y.

Please put me on your mailing list to receive the free bulletins of used equipment offerings.

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FUEL INJECTORS

- For All General Motors Diesel-Powered Equipment, including G.M.C. Trucks, Euclid, Lorain, Koehring, etc.
- Fully Warranted to YOUR Entire Satisfaction.
- Price Includes Replacement of Plunger and Bushing Assembly, when necessary.
- Send Us Your Order and Old Injectors Today, or Write for Complete Details.

MODEL 71 INJECTORS, ANY OUTPUT

Only **$12.50** Each and Old Injector

AMERICAN DIESEL SERVICE
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USED EQUIPMENT

BROWNING T15 Motor Crane
CASE Tractor with 1 yd. Lull Loader
CAT. D-4 Tractor with Loader
CLETRAC BG with Heil hyd. Bulldozer
HOUGH HAH 15 cu. ft. Payloader
HOUGH HF ¾ yd. Payloader
HOUGH HFH ¾ yd. Payloader
INT. TD-9 B-E hyd. Bulldozer
INT. TD-14 Isaacson hyd. Bulldozer
INT. T-14 Isaacson hyd. Bulldozer
INT. TD-18 B-E hyd. & cable Bulldozer
INT. TD-24 B-E cable Bulldozer
LaPLANT-CHOATE 8 yd. Scraper
LINK-BELT HC-70 Motor Crane
LORAIN L-41 Crawler Crane
LORAIN L-50-1 Crawler Shovel
NORTHWEST 105 Crawler Crane
NORTHWEST #2 Crawler Crane & Hoe

EDWARD EHRBAR, INC.
29 MESEROLE AVE. BROOKLYN 22, NEW YORK
EVergreen 3-5000

FOR SALE

Sauerman Power Drag Scraper 1½ yard
Ele. Motor 60 H.P. Unused
1—D-8-R series with hydraulic Angledozer and Towing Winch
1—D-7 7-M series with D.D.P.C.U. and Angle dozer
1—D-7-9G series with D.D.P.C.U. and Dozer
1—D-4 with Angledozer
1—D-4 with Towing Winch
1—D-4 with 2½ yard hydraulic scraper
1—T-D-9 with B.E. shovel dozer front end loader
1—Davey 105 Air Compressor
G.M.C. 6 by 6 with 8 to 10 yd. dump body
1—Insley 1947 Model K-12 ½ yd. backhoe
3—50-ton Butler Bin Hoppers
1—500-ton hopper with 72 ft. bucket Elevator
1—Roll type coal crusher
1—Tandem 8 to 10 ton Roller
1—3-wheel 10-ton Roller

OZAUKEE TRADING POST
Phone Co49955 2905 N. 17th Street
Milwaukee, Wisconsin

FOR SALE
Concrete Vibrators
$1,000 takes all
(listed at $1,428.50)

3 new 5 H.P. Dreyer Vibrators, Wheelbarrow Mounting, Wisconsin Motors, 14' Whips complete.
1 Housing with shaft 7'.
1 Housing 7'.
1 extra Head 2¼".

Crated, ready to ship.
F.O.B. Buffalo, N. Y.

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SPECIAL

1—⅜ Yd. Model 31 HANSON Trench Hoe (1950). New Motor. Very Good & Clean
1—⅜ Yd. Model 10B BUCYRUS-ERIE Hoe & Shovel
1—Model L-41 LORAIN Trench Hoe attach. only
1—Model 255A P&H Hoe & Shovel

THE PATTERSON EQUIPMENT CO., INC.
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— FOR SALE —

Ready Mixed Concrete Trucks Completely overhauled, cleaned and painted, new tires. Ready to go to work.

International ..... 3½ yd.—$7,000
Brockway ..... 5 yd.—$6,000
Autocar ..... 4½ yd.—$5,000
Autocar ..... 4½ yd.—$5,000
Or all in one package $20,000

MODERN ELMIRA HOMES, INC.
P. O. Box 370 Phone: Genesee 7301
ROCHESTER, NEW YORK

PORTABLE CRUSHING PLANTS

1 Model 880 UNIVERSAL SENIOR DIESEL
1 Model 880 UNIVERSAL JUNIOR DIESEL
1 PIONEER 152 P R PRIMARY 24x36 DIESEL
1 TELSMITH MODEL 1832-28-2 UNIT GASOLINE OPERATED 40/74 TON CAP. PER HR.

J. C. SEALY
HILLSIDE, NEW JERSEY

FOR SALE

Cleveland Trencher. Late model 140, used only about 3 yrs. Good condition.

D. S. MILLER
Star Route, Millersburg, Ohio

FOR SALE

LeTOURNEAU D ROADSTER. GM Diesel, 18:00x25 tires. 1951 model; like new.

COOKE TRACTOR CO.
2118 S. 7th St. St. Louis, Mo.
Phone: Sidney 1070

FOR SALE

LIMA 802 Diesel Dragline #2432, rebuilt, 70' boom, 3 cy. bucket, swamp tracks. Rent $2000/mo. apply purchase price $25,000 our yard.

KOEHRING DUMPTORS, WD60 Diesel, GMC engines, overhauled and ready to go. $4250.00 each our yard.

UNIVERSAL 293QH PACEMAKER Crushing & Screening Plant, w/18x24 jaw, #3 hammermill, feeder, screen, conveyors, etc., mounted on tandem rubber. Rebuilt. $16,500.

TD24 IHC with BE Dozer. New 1950 perfect conditon. $7500.

HD19 A-C with Berg SIDEBOOM. A-1. $6500.

SIMPLICITY 4x12 Four deck Screen with motor and drives. Excel. $2250.

TELSMITH 4x12 Triple deck Screen with motor and drives. A-1. $1500.

PIONEER Conveyors, 24x60, 24x45, 30x135, complete with motors. A-1. $1350, $950 & $3000.

Wenzel Machinery Rental & Sales Co.
2138 Jefferson St. Kansas City, Mo.
Phone: Harrison 0021

For Sale or Rental

4—600 LeRoi Airmasters with ME-21 Diesels, pneumatic tires. $5000.00 to $9500.00.

1—LeRoi Airmaster with Cat. D-13000 on pneumatic tires $6500.00.

All above compressors are in A-1 shape, cleaned, tested and painted. Guaranteed to produce full rated capacity, engine checked. All carry a 30 day guarantee.

CLEVELAND CONTRACTORS EQUIPMENT CO.
12500 BERA ROAD
CLEVELAND 11, OHIO

WANTED
Construction Equipment
WEBER & CO.
BOX 8037
CHATTANOOGA 11, TENNESSEE

LIGHT PLANTS

Hobart PE-197 rated 5 KW. 60 cyc. 1 phase 110/220 volts, 52 amps. at 80% power factor. Hercules 4 cyl. 20 HP. liquid cooled gasoline engine. Push button start, panel board with instruments, radio and television filtered. Steel skids. Weatherproof housing. Unused. Today's cost $1,800. Special Price $745. Guaranteed.

AIR COMPRESSOR UNITS at 25% Discount

New 30 c.f.m. tank mounted, 80 gallon, 7½ HP. 220/440 volts, 3 phase. List $728, Less 25% Discount. 5 HP. List $570, Less 25% Discount.

Prices F.O.B. Chicago. Write for Free Catalog. Send 10c for postage.

WELLWORTH TRADING CO.
1832 S. Wabash Ave. Dept. RB-1 Chicago 16, Ill.

1. **One Bucket elevator for aggregate manufactured by Columbus Conveyor Co. Purchased new July, 1952 and never erected. NEVER USED.**
   Length C-C 51'—6½"
   Capacity—100 tons per hour
   Motor Electric, 15 H.P., 3-Phase, 220-240 V.
   Buckets 14"x7" Spaced 16"
   Conveyor belt 112'—4"x16" 7 ply
   With boot and sprout
   Cost new $3871.00

2. **One Butler No. 7 track plant No. E 1370. This track plant is for unloading bulk cement at railroad siding and loading into bulk trucks.**
   Track screw 10"x17'—3⅜"
   Cement elevator capacity 230-260 bbls. per hour
   Overall height 25'—5"
   Height discharge sprocket 12'—4"
   Powered by LeRoy H.P. gas engine Model XP 30
   Purchased new October 1, 1952, for $3136.00
   This plant purchased new—never erected and NEVER USED.

3. **One Littleford steam generator for heating aggregate.**
   Model 1000 E, Electric Motor
   Maximum W.P. 300
   H.S. B 8794 H.S. 91 sq. ft.
   With 300 gal. fuel oil tank
   Purchased new Jan. 20, 1953. Worked less than 150 hours. Cost $2950.00

4. **One—400 bbl. one-compartment auxiliary, ground storage cement bin—Blaw Knox. This bin purchased new July, 1952 at cost of $2945.00.**

5. **One Barber-Greene portable belt conveyor.**
   50 feet long
   24" belt
   Wisconsin gasoline motor
   18 feet of extra new belt
   In perfect working condition.

HOWAT CONCRETE CO., INC.
SOUTH CAPITOL AT S. STREET
WASHINGTON 4, D. C.
PH. LINCOLN 6-5522

We do a Nation-Wide business in

STEEL SHEET PILING

IMMEDIATE SHIPMENT
220 pcs. 80 ft. Garn. M-116-Illinois
160 pcs. 53-50 ft. Inland I-22-Kansas
74 pcs. 35-32 ft. Garn. M-116-Tennessee
301 pcs. 30-26 ft. Both. DP-2-Texas
103 pcs. 21-17 ft. Garn. M-115-Virginia
Other lengths & sections used & new at other locations in United States for rent.
We have Nation-wide reputation for effecting QUICKEST SHIPMENTS
All sizes Vulcan & McKiernan Pile Hammers & Extractors for rent—Shop Rebuilt
Regardless of location of Job, Wire, Write or Phone

MISSISSIPPI VALLEY EQUIPMENT CO.
509 Locust St., Chestnut 4474, St. Louis, Mo.

DEPENDABLE USED MACHINES

Bay City 20-ton truck crane
Lorain 40 shovel and dragline
Galion motor grader
45-ton portable steel bin
Pioneer 3x14 scrubber screen
3-yd. Dumpcrete

TRACTOR & EQUIPMENT COMPANY
10032 Southwest Highway, Oak Lawn, Ill.

FOR SALE

Complete running gear and power erecting equipment for Cedarapids Model E Asphalt Plant.

Contracting & Material Company
1235 Dodge Avenue Evanston, Illinois

IMMEDIATE DELIVERY

A-C Model HD14 Tractor w/ angle-dozer.

A-C Model HD10W Tractor w/ angle-dozer.

A-C Model HD5G Tracto-shovel. Excellent condition — very reasonably priced.

A-C Model AD-3 motor patrol w/ cab & scarifier. A-1 condition.

"Caterpillar" Model D-4 tractor, good shape.

International TD35 Tractor. Cheap.

Hough Model HF Payloader, rebuilt.

A-C Model D Motor Patrol, completely rebuilt & guaranteed.

Adams Model 414 Motor Patrol.

A-C Model B wheel tractor w/ mower.

LeTourneau Model FP scraper, like new.

2—LeTourneau -12 Scrapers. Very cheap.

Northwest Model 18 Dragline.

Buckeye Model 402 Ditcher, completely reconditioned.

Slusser-McLean 8-10 yard cable scraper. Slightly used.

1—Novo traffic line marker.

ILLINOIS ROAD EQUIPMENT CO.
1310 E. Jefferson St.
Springfield, Ill.
Phone 2-7709

GM-6-71 DIESEL ENGINES
For Allis Chalmers Dozer
NEW SURPLUS
$1450
AND YOUR OLD ENGINE
Forbes Motor Co.
U. S. Route 22 at Monroeville
Turtle Creek, Pennsylvania
Phone VA. 4-0100

FOR SALE
COMPLETE CONCRETE PLANT

1 Air Compressor (Elec. Motor) for Cement Bin, New Nov. 1952.
1 100-ton Blaw-Knox 3-comp. Aggregate Bin, 5 yd. Hopper & Scales, New Nov. 1951.
1 400-bbl. Blaw-Knox Cement Bin 1 Comp. with Screw, Elevator & 5 yd. Hopper & Scales, New Feb. 1951.
1 400-bbl. Aux Cement Bin — Blaw-Knox, New July 1952.
1 Butler Hopper, 15" x 15" Gate, New June 1952.
1 Water Meter—2" Neptune, Model 240, New April 1950.
1 Butler No. 7 Track Plant with Screw, Elevator & Gas Motor, New June 1952
1 Littleford Steam Generator Plant—Model 1000E with Elec. Motor, New January 1953.
2 Aero Hot Water System with 1" Elec. Pump, New Jan. 1950.
1 Belt Conveyor with New, Never Used Extra Motor.
1 Front End Loader—¾ yd. Sheppard & Set Teeth, New June 1952.

ALSO

1 Bucket Conveyor, 100 Ton Per Hour, with 15 H.P. Elec. Motor. Never Used. New June 1952.
1 Butler No. 7 Track Plant, with Screw, Elevator & Gas Motor. Never Used. New Sept. 1952.
1 Butler Screw Extension, 10" x 10'. New Sept. 1952.
1 1-yd. Concrete Mixer with Elec. Motor.

This plant is now in operation and was put in operation completely new July 10, 1952, and has handled less than 50,000 cu. yds. of concrete. Can be seen by contact with our Washington office.

HOWAT CONCRETE CO., INC.
2 "S" STREET S.W.
WASHINGTON 4, D.C.
Phone: LIncoln 6-5522

FOR SALE

ONE NEARLY NEW 1952 Barber Greene Model 866 Gradation Control Unit, S/N 866-52-29, w/ 4'x8', Simplicity 3½ deck screen, four compartment bin w/calibrated gates over two interlocked apron feeders, semi-trailer mounting, pneumatic tires, air brakes, jacklegs. Screen driven by 880 Hot Elev. Hopper plates, Long Gooseneck and King Pin Adapter, w/Military Extras. List price F.O.B. factory, $14750.00. Will sell for 10% less list price F.O.B. Mitchell, S. Dak.

G. H. LINDEKUGEL & SONS
MITCHELL AIR BASE
MITCHELL, SO. DAKOTA
PHONE 900

FOR SALE

Koehring 34E Dual Drum Paver
37-B Bucyrus-Erie Crane-Dragline
Lima 34 Paymaster Crane-Dragline Shovel
Lorain L50 Crane-Dragline
2 Caterpillar No. 12 Graders
A-1 Barber-Greene Model 848 Heavy Duty Asphalt Plant Consisting Of:
- Model 848 Mixer
- Model 880 Hot Elevator
- Fines Hopper
- Model 880 Elevator 27'
- Model 866 Gradation Unit
- Model 837 Single Drum Dryer
- Model 851 Dust Collector
- Model 881 Cold Elevator
- Model 813 Reciprocation Feeder
- Caterpillar D4600 Engine
- Caterpillar D13000 Engine
- Hydraulic Hopper

Etnyre 1250 Gallon Distributor on Mack Truck
Hopkins Low Pressure Burners
1946 Mack LF Diesel Tractor
1947 Fontainne Trailer 25 Ton

United Southern Contractors, Inc.
GREENVILLE, SOUTH CAROLINA
P. O. BOX 1152 PH. 2-1846

FOR SALE

Allis-Chalmers HD-10 Tractor—Serial No. 8911; clean, good shape—no blade; recent engine rebuilt $3,500.00

3—Adams No. 512 Motor Graders; good shape, each $4,000.00

Caterpillar D-4, serial No. 7U-12652—with 4-A Dozer No. 6F-3272, No. 44 Hyd. Pump DV, No. 7W-1528; excellent shape, clean, only 875 hours $6,800.00

Caterpillar No. 80 Scraper—Used three weeks, Serial No. 5W-185; perfect; with big tires; like new $11,500.00

Caterpillar D-4 Tractor, serial No. 6U-1019, with No. 44 Pump and Straight Blade; rebuilt $5,000.00

Caterpillar D-4, serial No. 6U-1960, with No. 44 hyd. pump only; rebuilt $5,000.00

Caterpillar D-7 Tractor, serial No. 3T-7750, with Caterpillar Hyd. Angledozer; perfect; clean $10,000.00

Caterpillar No. 70 Scraper—serial No. 8C-2540; used only 90 days; perfect $8,500.00

LeTourneau Model "M" Scraper; good rubber; A-1 condition $2,000.00

Seaman Tiller—GM Diesel Engine; used very little $2,900.00

HOLT EQUIPMENT CO.
P. O. Box 567 Phone Weslaco 145
Weslaco, Texas

TRUCKS WANTED

Highest dollar value paid for new and used trucks and all kinds of used equipment. All types of truck equipment bought and sold, including war surplus. Write, phone or wire:

BILL FISHEL
VANDEVENTER AUTO SALES
717 So. Vandeventer Ave., St. Louis, Mo.
PHONE FRANKLIN 1750

FOR SALE

8 TERRA COBRAS

EXCELLENT CONDITION

Purchased in 1950
Each operated between 4000 and 5000 hours
Serial Nos. between 34123 and 34167
5 have 200 HP Cummins Engines and 2100 x 24
3 have 225 HP Cummins Engines and 2400 x 25, 24 ply tires

1 SUPER C TOURNADOZER NO. 2294

4 LAPLANT CHOATES TS 300

Serial Nos. between 586 - 591
Purchased in 1951
Operated between 3000 and 4000 hours

GEORGIA KAOLIN CO.
Dry Branch, Georgia

Pile Driving Equipment

Vulcan and McKiernan-Terry
Steam Pile Hammers and Extractors
Pile Driving Accessories
Drop Pile Hammers and Caps
Steel Sheet Piling

CONTRACTORS MACHINERY CO.
2651 Southwest Blvd. Kansas City 8, Mo.
Phone Valentine 4740

FOR SALE

MODEL 255A BACKHOE

Completely rebuilt, now working $12,500 F.O.B. Lutherville, Maryland.

Lutherville Supply & Equipment Co.
Front & Lincoln Ave. Lutherville, Md.

FOR SALE

One Allis-Chalmers HD5G Tractor with Tractomotive Shovel in good condition.

Price $6000.00

MELVIN KLOTH
Sparta, Illinois Ph. 264W-414

STORAGE TANKS FOR SALE

8,000 and 10,000 gallon, with and without coils, also other sizes available near Pittsburgh, Penna.

Write, phone or wire
BRIGGS & TURIVAS
Imperial, Penna.

FOR SALE

1 Buckeye, Model 402 Trencher. Digs 8" wide by 4' depth.
1 LaCrosse 5 Ton Trailer for transporting Trencher.

Priced Reasonable

GEORGE F. COOK CONSTR. CO.
2833 Lyndale Avenue So. Minneapolis, Minn.
RE 8211

Koehring Co. initiates Koehring Southern Co.

The opening of a new subsidiary plant of the Koehring Company at Chattanooga was celebrated April 17-22 by an "Open House." The program consisted of guided tours through the modern machine tool equipped plant, 120 ft. wide by 800 ft. long.

A special construction equipment exhibit of products of the Koehring Company and its subsidiaries featured some 25 pieces, among them being excavators, cranes, dumptor, pavers, mud-jacks, trenchers, mixers, batchers, cement chargers, clam shell and concrete buckets, power-barrows, and fork lift. Visitors got a preview of the two new shovels to be built at the Koehring Southern plant.

★ Display during Chattanooga "Open House" of equipment manufactured by Koehring Company and its subsidiaries

Lessmann Manufacturing Co. Sold. The Lessmann Manufacturing Co., Des Moines, Ia., has been purchased by the United Steel Barrel Co., Philadelphia, Pa. The new owners expect to franchise heavy equipment dealers in all parts of the country for sales to the construction, quarrying, coal, mining and similar fields.

Meyer Now General Sales Manager. Martin Meyer has been appointed general sales manager of Sauerman Bros., Inc., Chicago, Ill., to fill the vacancy caused by the passing away of Dwight D. Gullfoil on May 3. Mr. Meyer joined the Sauerman organization in 1943. He has been assistant sales manager since 1948 and is a director of the company.

Motorola Moves Regional Office. Motorola Communications and Electronics, Inc., Chicago, Ill., has moved its southwest regional office from 6310 Denton Drive, Dallas, Tex., to new quarters at 171 Parkhouse St., Dallas.

New Galion District Representative. Hal J. Moddy has been appointed district representative on motor graders and rollers for the Galion Iron Works & Mfg. Co., Galion, O., in the states of Louisiana, Mississippi, Alabama and Arkansas.

Manufacturers' Literature

Use the post card insert. Just circle numbers of items on which you want more information.

Two new brush control sprayers

A 4-page catalog on its new "Ranger" brush control sprayers has been issued by John Bean Division, Food Machinery and Chemical Corporation, Lansing 4, Mich. Two models are illustrated and described. Model 20-MTB delivers 20 gal. per minute at pressures up to 700 lb. This model has two 100 ft. lengths of high pressure hose and is easily mounted on a pick-up truck or power wagon. Model 07-MTBT delivers 7 gal. per minute at 400 lb. pressure. It is mounted on wheels and can be drawn by Jeep, passenger car, light truck or tractor.

For additional information circle Number 72 on inquiry card.

New Disc Attachment For Motor Graders

The new Shav-O-Disc, a disc attachment, mountable on all types and models of motor graders, is described in a 4-page bulletin, issued by T & M Manufacturing Co. The Shav-O-Disc operates under the full weight of the motor grader, cuts its own furrows to a depth of 64 in., weighs 1,740 lb. and its parts are all replaceable from standard stocks.

For additional information circle Number 63 on inquiry card.

New Lubrication Data Book

Lubriplate—The Modern Lubricant—is the title of a 56-page data book on recommended lubrication and greasing practice. The true cost of lubrication must be reckoned with from a standpoint of machine operating efficiency, power consumption and maintenance costs. Economic lubrication and not the initial cost of lubricants should be the governing factor regarding lubrication of equipment. This data book which will be mailed gratis to any one writing either to the manufacturer or to this magazine discusses the control of friction, the Lubriplate tag plan, product data, proper application, construction equipment along with equipment for other industries and a list of distributors. The data book is pocket size. To get a copy, address this magazine or write to the manufacturer, Fiske Brothers Refining Co., Newark 5, N. J.

For additional information circle Number 64 on inquiry card.

Seeder Eliminates Costly Hand Labor

A new 5 ft. 4 in. landscape seeder that does the crushing, seeding and rolling in one operation is pictured and described in a 2-page folder issued by Brillion Iron Works, Inc. It is stated that one man with this seeder does a better job in three hours than five men can do by hand in three days.

For additional information circle Number 65 on inquiry card.

Hydraulic Pumps and Controls for Mobile Equipment

A new catalog covering a complete line of oil hydraulic equipment for mobile applications has been published by Vickers Incorporated. Catalog M-5101 provides latest specifications and engineering information on Vickers hydraulic vane type pumps and motors, valves, power steering pumps and steering boosters, and other

oil hydraulic units specifically designed for equipment in the construction machinery automotive, materials handling, agricultural and mining industries.

For additional information circle Number 66 on inquiry card.

Adams All-Purpose TraveLoader Described

A new catalog announced by J. D. Adams Manufacturing Co., completely illustrates and describes the Adams all-purpose TraveLoader. Action pictures show the machine at work on various types of windrow and stockpile loading. This includes picking up surplus material on ditch-cleaning, road reclamation jobs, snow loading, loading on contract jobs, loading stockpiled materials such as creek gravel, graded gravel, coal, silt, etc. Among the machine's features illustrated are high, centrally-located cab, high-speed revolving feeder, heavy-duty industrial engine, conveyor adjustable to various sizes of trucks, high travel speed of 25.5 mph, etc.

For additional information circle Number 67 on inquiry card.

Loading Ramps Made of Magnesium Diamond Plate

New literature on Penco magnesium ramps has been issued by Penco Engineering Co. Two new ramps are fully detailed and illustrated: (1) The Penco flared ramp for car loading operations, and (2) The Penco two-section ramp for truck loading operations. The car loading ramps are made in capacities from 3,000 to 10,000 lb. The truck ramps have capacities from 1,000 to 5,000 lb. All Penco ramps are one-man operation, made from lightweight magnesium diamond plate, are easily placed in position and easily removed.

For additional information circle Number 68 on inquiry card.

Costs, Specifications on New Stampco Hand Winch

Two color catalog sheet illustrating new Stampco hand winch has been issued by Stampco Products. It covers specifications, costs and engineering features of the mechanical winch, and details various construction and industrial applications of the equipment.

For additional information circle Number 69 on inquiry card.

Regulation and Warning Traffic Signs

A new 16-page catalog covering Reflexite signs has been issued by Reflexite Corporation. Reflexite is a patented reflecting material. It has been used for signing many high speed highways where long life and high reflecting intensity are a must. Among these are the Merritt Parkway in Connecticut, the Taconic State Parkway in New York, the New Hampshire Turnpike and the new Route 128 Expressway in Massachusetts. Specifications of Reflexite material are included in the catalog, as well as illustrations of many typical signs.

For additional information circle Number 70 on inquiry card.

Hydraulic Puller Manual Discusses Maintenance Problems

Industrial maintenance problems involving the removal and installation of gears, bearings, pulleys, sheaves, pinions, shafts, couplings, tubes, etc., by hydraulic power are treated in a new puller bulletin released by the Owatonna Tool Co. This bulletin covers the use and application of pullers, attachments and adaptors for three sizes of hydraulic rams, 17½, 30 and 50 ton. It also illustrates complete puller sets for industrial maintenance in addition to shop and bench presses suitable for use with the OTC, center-hole rams.

For additional information circle Number 71 on inquiry card.

With the Manufacturers and Distributors

Bill McGraw Joins Bucyrus Steel Products. Arno W. McGraw, senior partner of Bucyrus Steel Products, Bucyrus, O., has announced that his son, A. William McGraw, Jr., is joining the firm in the active capacity of general manager in charge of manufacturing and sales. "Bill" McGraw, who for more than four years has been manager of sales for the W. A. Riddell Corporation, has been a partner in the firm Bucyrus Steel Products since its inception in 1951, though he has not been actively engaged in its management. "Bill" holds a B.S. degree in Industrial Engineering and prior to joining the W. A. Riddell organization he held a sales position with Marion Power Shovel Co. Bucyrus Steel Products began operations in their especially equipped new factory on Nov. 1, 1951. They are manufacturers of "precision punched" cutting edges for road construction and maintenance equipment and snow plows.

Gronlund Rejoins Pettibone-Mulliken. John Gronlund, widely known in the heavy construction and earth-handling business, has returned to Pettibone-Mulliken Corp. as district representative. His headquarters will be at Pettibone-Mulliken's New York office in the Empire State Bldg. and he will work with Pettibone-Mulliken, Universal Engineering and Haiss distributors in New York City and vicinity, Connecticut, New Jersey, Delaware, Maryland and Pennsylvania.

Homelite Opens New Regional Office. E. W. McClellan, formerly manager of the Buffalo District Office, has been appointed midwest regional manager for Homelite Corporation, Port Chester, N. Y. He will be in charge of the new regional office at 120½ South Grove St., Elgin, Ill., which was opened on May 1st. The following changes in Homelite branch and district managers, effective May 1, have been announced: Frances "Bud" Darrow, former assistant to Mr. McClellan in Buffalo, is appointed manager of the Buffalo District Office. Ted Skroch, present manager of the Grand Rapids, Mich., Branch Office, will be manager of the Indianapolis District Office. Harold E. Wiersum will be manager of the Branch Office in Grand Rapids, Mich. James W. Thompson, now manager of the Indianapolis District Office, will take over the Charlotte, N. C., District Office.

Eutetic Opens New Office. Eutetic Welding Alloys Corporation, Flushing, N. Y., has established a new eastern divisional office at 1060 Broad St., Newark, N. J. Herman J. Greif, eastern divisional sales manager, will head the staff at the new office.

Bennett of Hercules Retires. J. Leroy Bennett, manager of Chemical operation for the Explosives Department of Hercules Powder Co., Wilmington, Del., and past president of the American Institute of Chemical Engineers, has retired after 46 years with the company.

Clark Equipment Buys Michigan Power Shovel. Clark Equipment Co., Buchanan, Mich., a manufacturer of materials-handling industrial trucks and heavy automotive transmissions, has acquired all the capital stock of The Ross Carrier Co. of Benton Harbor, Mich. Michigan Power Shovel Co., a subsidiary of Ross Carrier Co., is included in the transfer.

Le Tourneau Sold to Westinghouse. Westinghouse Air Brake Co., Wilmerding, Pa., has purchased the business of R. G. Le Tourneau, Inc., Peoria, Ill., including all fixed assets and machinery at Peoria, Ill., Toccoa, Ga., and its interest in the Australian subsidiary for approximately $19,500,000. Westinghouse will also take over certain current assets of the Le Tourneau Company consisting principally of inventory at book value less reserve, at an estimated price of $6,000,000 to $8,000,000.

Dyke New Oliver Export Manager. Leslie A. Dyke has been appointed export manager of The Oliver Corporation, Chicago, Ill. Before his recent appointment, Mr. Dyke had been, from 1945 to 1952, Oliver's Australian manager in charge of distribution in Australia, New Zealand, India, Pakistan, Burma, Thailand, Indo China, Japan, and the Pacific Islands.

Dravo-Doyle Makes New Appointments. The board of directors of Dravo-Doyle Co., wholly owned subsidiary of Dravo Corporation, Pittsburgh, Pa., engaged in the sale and rental of construction equipment, has appointed C. N. Hollingsworth, Jr. general manager, and John H. Noble, sales manager.

Distributors Wanted. Pacific Engineering Sales Co., 3938 Wilshire Blvd., Los Angeles 5, Calif., manufacturers of Pacific all-steel clamps for use in construction of concrete curbs, has announced that distributorships of the clamps are now available on a non-exclusive basis, to be open to all distributors and dealers.

New Distribution Program. A new distribution program for the Stampco Roll-O-Hoist, formerly handled exclusively by one national sales company, will make sales franchises for the equipment available to qualified distributors in many new marketing areas. The Roll-O-Hoist is a materials tower that rolls with the job. It is a product of St. Anthony Machine Co., Minneapolis, Minn.

D. D. Guilfoil Is Dead. Dwight D. Guilfoil, 66, vice president and general sales manager of Sauerman Bros., Inc., Chicago, Ill., died of a heart attack in his home in Chicago on May 3. He had been with Sauerman Bros., Inc., since 1913, except for a period during World War I, when he served with the 108th Engineers in France, coming out of the war with the rank of Major. Mr. Guilfoil had been active at various times in the affairs of the manufacturers' divisions of the National Sand and Gravel Association, the Associated Equipment Distributors, and other trade associations, and was a familiar figure at the annual conventions of these groups. He was a long-time member of the Chicago Engineers' Club.

INDEX TO ADVERTISERS

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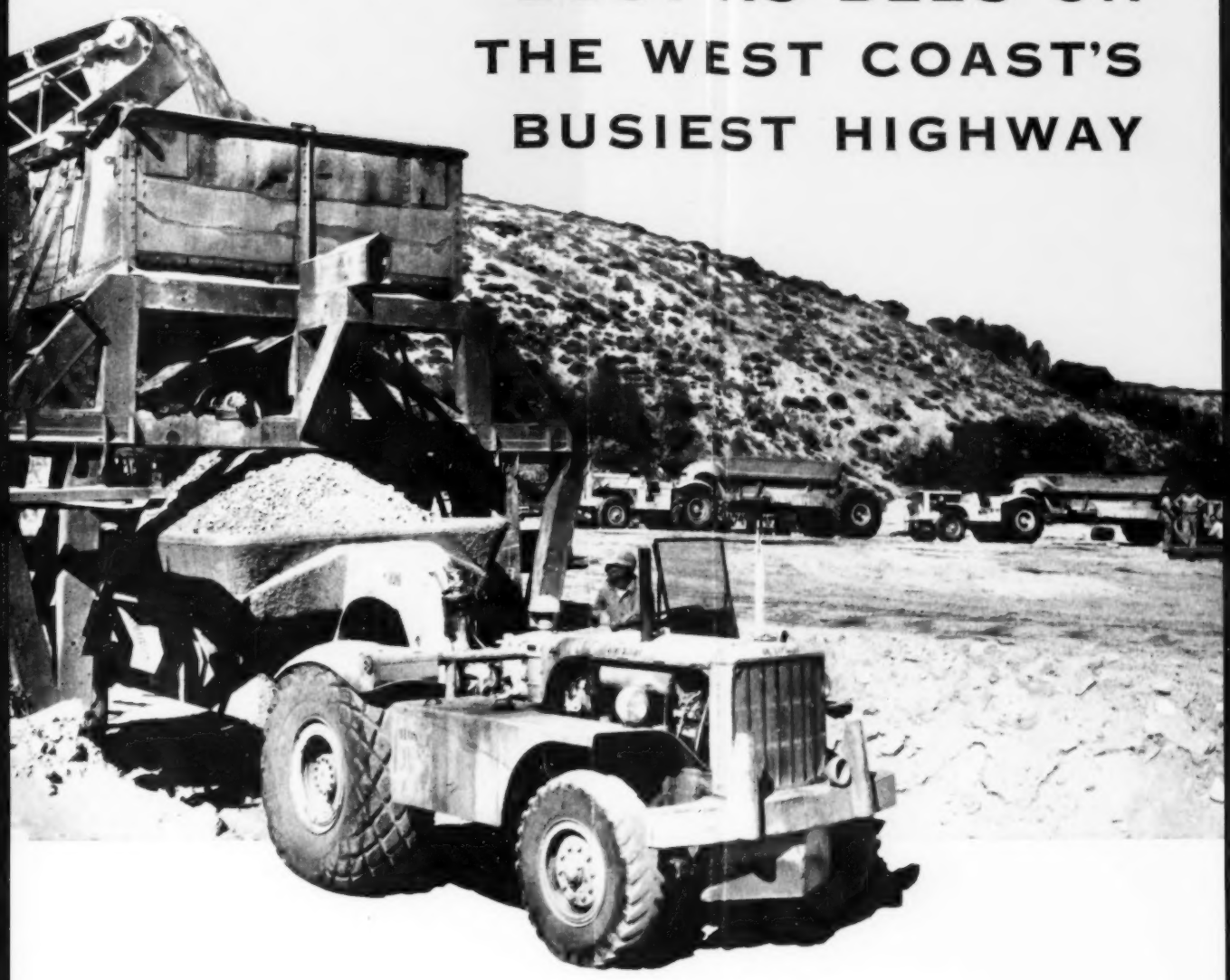
*Advertisers with * are represented in the 1953 edition of Gillette's Heavy Construction Profiled Catalog. Please refer to it for additional information on any of their products.*

BUSY AS BEES ON THE WEST COAST'S BUSIEST HIGHWAY



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The seven perfectly matched Cat* DW10s and W10s haul 3½ miles one way up a 6% grade. In a 45-minute round trip they carry 25 tons of rock base material, and by the time the job's finished, over 500,000 yards will have been moved.

You just can't beat Cat earthmoving equipment for lugging ability, positive ejection of sticky loads, speed, dependability and long life. The DW10 has a smooth, constant-mesh transmission and a heavy-duty clutch. Hydraulic power steering makes work easier for the operator, and turning radius is only 37 feet nonstop.

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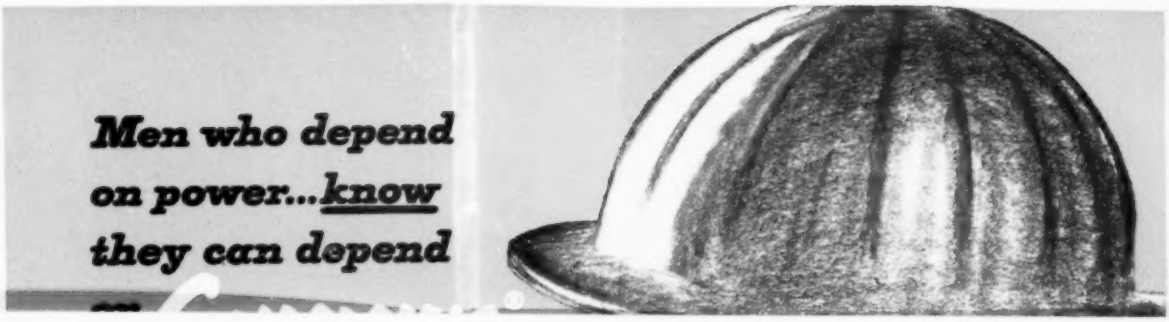

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